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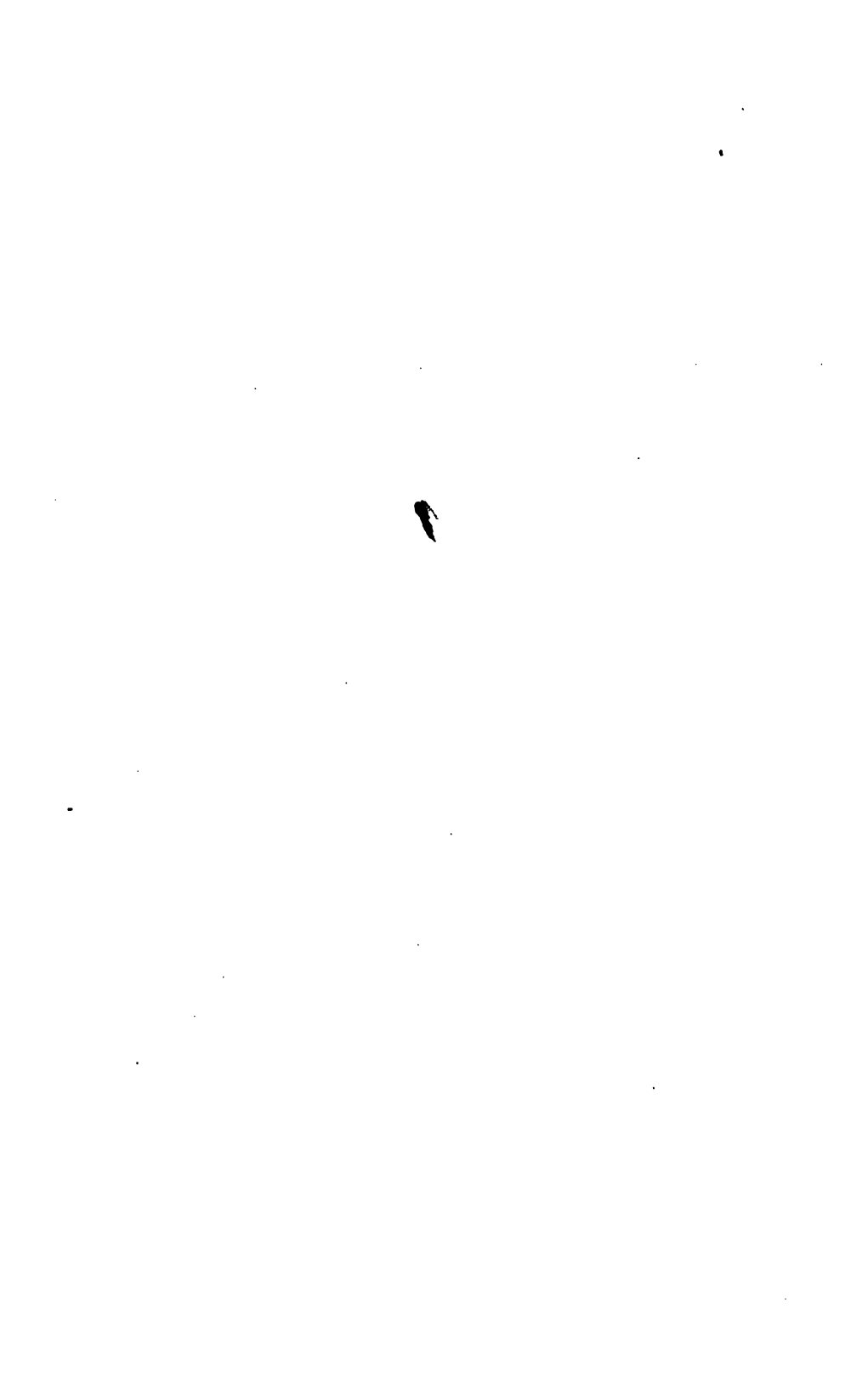
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THE
ALKALINE AND NON-ALKALINE
TREATMENT
OF
ACUTE RHEUMATISM
BY
C.S. TAYLOR. M.D. B.Sc.

THE
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OF
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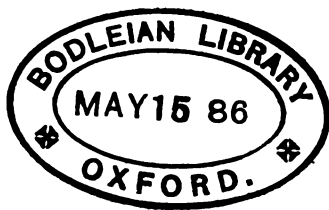
THE
ALKALINE AND NON-ALKALINE
TREATMENT
OF
ACUTE RHEUMATISM,
ITS
THERAPEUTIC ACTION,
AND ITS
PATHOLOGY.

BY
C. S. TAYLOR, M.D., B.Sc.

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TO

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CROSS MEDICAL SCHOOL,

SENIOR ASSISTANT-PHYSICIAN TO THE HOSPITAL FOR CONSUMPTION

AND DISEASES OF THE CHEST, BROMPTON,

This Small Work is Inscribed,

WITH MUCH GRATITUDE AND RESPECT,

BY HIS FORMER PUPIL,

THE AUTHOR.

P R E F A C E.

WHERE knowledge of the intimate phenomena of acute rheumatism ran short, it seems that the gap was stopped with speculative and hypothetical assumptions. Thus the fundamental link between the disease denoted by the term "acute rheumatism," and those grouped in virtue of purely superficial characters, was looked for—now in a rheumatic poison or acid crasis—now in electrical conditions of an abnormal kind,—nay, even in a similarity of reaction to particular remedies, etc. These hypotheses have all broken down, at any rate in their application to the diseases collectively designated "rheumatism," every attempt to bring the latter under a common category, with a claim to scientific recognition, has failed in the past, and will probably fail in the future. For "rheumatism," as now understood, possesses as little pathological homogeneity as it did at a former period, when its domain was wider than it now is. Its limits have been gradually narrowed year by year; gout, arthritis deformans, the articular neuroses and other forms of neuralgia, the painful affections of the muscles depending on toxic and infective processes, have been successively withdrawn, as they are found to be

disorders *sui generis*, or due to special causes. We may fairly anticipate that the pathological residue which is still comprised under the head of "rheumatism," will continue to undergo the same process of differentiation, for there can be no doubt that it includes diseases which are radically heterogeneous. For instance, "acute articular rheumatism" and "chronic articular rheumatism" have only the superficial resemblance to each other.

Accordingly, if "rheumatism" cannot be maintained as a nosological category, it necessarily follows that the term itself is not merely superfluous, but, as has been pointed out by Henle, and more recently by Hueter, positively detrimental, since it calls up erroneous, or at any rate, unfounded notions of an underlying harmony between various forms of disease, some of which are known to be distinct, while concerning others we are very ignorant.

In harmony with the above principles, the following are the diseases to be described, conjointly with their various treatments, both alkaline and non-alkaline, in the ensuing pages.

(a) Polyarthritic rheumatism, or acute rheumatism, which essentially is a constitutional disease.

(b) Affections which may be regarded as of local nature, viz: chronic rheumatism, and the various forms of Myopathy or Myalgia rheumatism.

(c) And as a disease of the joints, etc., we may include Gonorrhœal rheumatism.

Apropos, of the actual treatment of rheumatism, it has varied very much with our theories concerning its pathology; at any rate, since rational therapeutics—*i.e.*, methods of treatment, either really or apparently in harmony with accepted

views on pathology — were substituted for traditional empiricism. The strictly antiphlogistic method as it used to be understood—bleeding, refrigerant salines, mercurial and antimonial preparations—has all proved inadequate.

The belief in a specific cause of treatment in acute rheumatism of the alkaline and non-alkaline treatments, has led to the perpetual renewal of attempts to discover a specific remedy. Even at the present day we find a number of remedies which claim to be regarded as specifics, their claims resting on the different theories concerning the nature of the *materies morbi*, and the best way of rendering it harmless, or of removing it altogether from the system. Such attempts are quite legitimate ; but no remedy has, (although the compounds of salicyl in some cases has proved beneficial) up to the present time established its claim to universal favour, none has been found to possess undoubtedly specific virtues, to be capable of summarily arresting the disease under all circumstances. Each individual remedy is lauded for some special property. One is believed to shorten the attack, another to subdue the pain and fever, and a third to ward off dangerous complications. The natural course of the malady is so irregular, that it is no easy matter to decide on the value of any particular mode of treatment ; and the difficulty is enhanced by the limitation of the clinical material at the disposal of the individual observer. Hence, in the following pages, I shall not attempt to do more than enumerate those remedies and methods which have been tried by reliable observers, and likewise by myself, and recommended by them on the ground of a tolerably large pathological, therapeutical, and clinical experience.

Of the present advanced state of our knowledge, in the compass of a small volume like this, I am well aware how difficult it is to give anything like an adequate view. I hope, however, that nothing which is of real importance will be omitted, and that as far as it goes, it may be received in the same way as the legacy of the pot of gold in the fable was received by the rustic testator's sons. If the present work, though like the old man's vineyard, really containing in itself no gold—should only lead to the zealous cultivation of the subjects of which it treats, the result could not fail to be of inestimable value to the common treasury of physic, for which I expect and desire no better fortune than that it may add something, however small, to the true and good therein contained.

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INTRODUCTION.

During the present century, and especially during the past twenty years, since the attention of physiologists and pathologists has been particularly directed to the investigation of the intimate structure of the solid and fluid parts of the body, by means of chemistry and the microscope, results have been obtained which have given a new direction to men's minds ; *apropos* certain points of pathology, or rather old paths of inquiry armed with new powers, and guided by more philosophical views. One consequence of this has been the revival of the old humoral pathology in a less problematical form ; and, with this, as a necessary result, the resuscitation of the almost exploded theories of the direct and specific treatment of rheumatism, and in a word, diseases in general.

Several of the old crude notions respecting the impregnation of the blood and other constituents of animal bodies, solids as well as fluids, with the material causes and products of diseases, have been reformed and verified by chemistry, therapeutic, and pathology, as positive facts, while the introduction of several medical and chemical substances, not only into the blood, but into the parenchyma of organs and their various secretions, has been demonstrated in the most unequivocal manner. Some of these medicines have been found unaltered both in the interior of the body and in the excretions ; while others have been found modified either by the normal processes always going on in the system, or by the action of substances met with in their progress through it.

As some of the agents thus capable of permeating every part of the body are known to be possessed of powers capable of modifying vital action, both dynamically and chemically, it is impossible to avoid receiving the conception, and entertaining the conjecture, that they may thus directly modify diseased states, whether functional or structural, and so relieve or cure diseases in a direct and specific manner. It is even extremely probable that they do so ; and it seems a most legitimate object of our tentative art, to endeavour by direct experiments, to ascertain whether this probability can be converted into certainty.

There does not appear to be any sufficient reason, a priori, why the same or similar results which we see taking place on the skin and mucous surfaces of the body, or in its cavities or passages on the direct application of medical and chemical agents, may not also take place in the intimate tissues of organs, on the same or analogous agents being conveyed to them by the blood ; and, still more in the blood itself, in the cases where we believe the *materies morbi* to exist primarily in that fluid.

Whatever cheering prospect must thus be opened for the future, it must be confessed that hitherto practical medicine has derived but slight advantage from the new facts and views for which the profession is indebted to recent chemistry, therapeutic, pathology and microscopy.

In some of the old cases of acknowledged specific action, or quasi-specific action, a nearer approach has certainly been made towards explaining the rationale of the process of cure ; or at least, better grounds have been furnished for a more rational conjecture ; and some ingenious suggestions have been made as to the employment of new medicines in certain diseases, on the principles of the new organic chemistry and chemical pathology, but I fear it can hardly be admitted that we have as yet, made through this channel any very positive additions to our list of specific remedies, or ascertained any new means for the more effective employ-

ment of the old. If the indication of treating acute rheumatism or diseases in general on the specific principle, were in practice, limited to the few diseases to which it is certainly applicable, we should have no ground under this head for complaint against the Medical Art for incompetency to fulfil its objects, and still less for its being productive of evil instead of good. But unfortunately the same indication as a ground of treatment has been extended by medical men, in all ages, to numerous affections to which it is most imperfectly or not at all applicable, and with the effect of introducing modes of treatment almost always ineffective and often most injurious.

Through this pseudo-specific treatment of acute rheumatism, like the true, claims experience for its foundation—hence its name *empirical*,—it must be admitted that the grounds for such a claim are, in a vast proportion of cases, altogether imaginary. In a certain number of the instances in which it is employed, there is no doubt sufficient evidence derived from positive experience to justify the practice.

Although falling short of what we may properly term *specific or antidotal*, the results in such instances being more or less beneficial, or at least, not being injurious, authorise the use of the remedies producing them, in the absence of others propounded on higher indications. The practice is at least rational, and is not the less so because the results, when traceable at all, are slight in degree, and genial in kind. If the agents do not aid nature much, they do not thwart and outrage her.

But, unfortunately, this pseudo-specific, or rational empirical treatment, is far from being confined in practice to the small number of diseases to which it ought to be legitimately restricted on the ground of experience, or to that class of agencies which are in their nature innocent. On the contrary, there is hardly a disease to which, under

some plea or other of imaginary or false experience, it is not made applicable, and hardly a remedy, whether inert or powerful, that is not enlisted in its service.

In no department of science or art, in no phasis of human action involving ratiocination and inference, are more false grounds admitted, or more false conclusions, drawn than in this case ; and the practical results are such as might be expected to flow from such a source. Every drug that has at any time been regarded by anybody as possessing some specific, or special power, either in curing diseases or influencing the functions of the organs in which they are supposed to have their seat ; every drug that has been recommended by practitioners, more especially by teachers and authors, simply as beneficial in certain diseases, though on no better evidence than that it was employed in cases that recovered ; every drug that has been proposed by writers as of probable or even possible utility, on mere theoretical grounds ; every drug that has been suggested by analogies, however vague ; every drug that has not been previously prescribed in the particular disease in hand ; in a word, almost every drug in our overflowing *Materia Medica*, whether inert or active, has been on some ground or other copiously prescribed in every variety of disease, under the supposed sanction of this pseudo-specific or empirical indication. Now let it be supposed that this empirical practice is only of a past day only. It is at this very time in as great a vogue as ever, although its employment may be often veiled under the technicalities of newer science. Nor is it confined to the ignorant or inexperienced among-us, but adopted and followed by men of the greatest eminence in the profession.

No doubt it is followed by such men, not from any fixed conviction of its propriety or usefulness, but rather from the influence of other causes—from conventionalism or traditional habit ; from indolence or carelessness ; from indifference

founded on a just reliance on the restorative powers of nature ; from consciousness of the inherent deficiencies of art, and from the uncertainty of having agencies of greater promise at command.

The good or the evil arising from pseudo-specific, or empirical practice, will depend on the character of the agents employed, and thus on the knowledge and skill of the employer. The experienced and wise physician, if he does not much good, will do little harm by it ; the ignorant, inexperienced, and rash practitioner may make it the means of inflicting the greatest calamities.

In the case of inert or feeble remedies being prescribed in cases of acute rheumatism on this principle, little or no harm can arise, except indirectly by preventing the use of other means possibly more effective ; but when medicines of positive power to influence the structures and functions of the body are so employed, direct and positive evil to the course of the existing disease, and even injury to the system at large, may be—nay, must be—the consequence. The main object therefore of this work is to give a fair explanation of the principles and descriptive of the practice of medicine, is to prepare the reader for observing to the best of advantage, the actual phenomena and symptoms of the various forms of rheumatism and diseases in general, and the power of the alkaline treatment over it ; in a word, the power of remedies over diseases in their general aspects. The first part then of the course will embrace an outline of pathology and therapeutic, with an especial reference to those morbid conditions which fall to the care of the physician. It is intended likewise to fit the readers for seeing with intelligence—to enable him to read and understand, and interpret the book of nature when it is laid open before him—in short, to qualify him for clinical study. One man shall travel into a foreign land, knowing nothing before hand of its scenery or its climate, of its natural productions,

its manufactures, or its works of art, and ignorant alike of the manners, customs, history, laws, and language of its inhabitants. Another shall visit it after having furnished his mind with information on these subjects by reading, and by conversing with men who have already passed over the same ground. Supposing the visit to be limited in each case to a certain, but not long period of time, I need not ask your opinion as to which of these travellers will reap the greatest harvest of enjoyment and of profitable knowledge from his tour. I also would have the reader of this work to exercise, and ultimately abide by, his own judgment; but surely if all professional men were to depend upon his own unassisted observation for his knowledge of disease, every one then would be marvellously ignorant, and the medical art would stand still, or cease to be. "If no use be made (says Dr. Samuel Johnson) of the labours of past ages, the world must remain always in the infancy of knowledge." In truth, a practitioner, who without any previous information concerning the diagnosis of diseases, should betake himself to a hospital or bed side of a rheumatic or other patient with the design of impartially and resolutely investigating their phenomena, such a practitioner I say, however clear and strong his intellect might be, would find himself for a long time, more puzzled than instructed by what he saw around him. He would be perplexed by the shifting and seemingly contradictory characters presented by the same malady in different rheumatic patients, or in the same patient at different times; and not less so by the untoward resemblance of disorders essentially unlike. He could not but be confused by the multitude of symptoms that crowded upon his attention on every side; and at a loss to distinguish important facts from those which, for the chief ends of his pursuit, were trivial or useless.

These duties therefore of the practitioners are metaphorically but aptly expressed in the following passage from Lord Bacon.

"Formica colligit, et utitur, ut faciunt empirici; aranea ex se fila educit, neque a particularibus materiam petit, ita faciunt medici speculativi ac mere sophistici; apis denique cæteris se melius gerit.

Hæc indigesta e floribus mella colligit, deinde in viscerum cellulis concocta maturat, iisdem tamdin insudat, donec ad integram perfectionem perduxerit."

I may venture to paraphrase it thus :

The lecturer must not be the ant, collecting all things indiscriminately from all quarters, as provender for his discourses ;

Nor the spider, seeking no materials abroad, but spinning his web of speculative doctrine from within himself; but rather the bee, extracting crude honey from various flowers, storing it up in the recesses of his brain, and submitting it to the operation of his internal faculties, until it be matured and ready for use.

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ON THE
PATHOLOGICAL AND THERAPEUTICAL ACTIONS
OF
THE ALKALINE AND NON-ALKALINE TREATMENT
OF ACUTE RHEUMATISM :

BY
DR. C. S. TAYLOR, B.Sc.

" Diseases which arise from repletion are cured by depletion ; and those that arise from depletion are cured by repletion ; and, in general, diseases are cured by their contraries."

—HIPPOCRATES' *Aphor.* (II. § 22).

" Who shall decide when doctors disagree,
And soundest casuists doubt like you and me ?—
You hold the word, from Jove to Momus giv'n,
That man was made the standing jest of heav'n,
And gold but sent to keep the fools in play,
For some to heap, and some to throw away."

—POPE.

CHAPTER I.

GENERAL OUTLINES OF RHEUMATISM.

THE word Rheumatism is derived from the Greek *ρευμα*, a fluxion, and it arises from some disordered or abnormal condition of the blood. Its frequency has attracted the attention of physicians both in ancient and modern times, and much speculation has been excited as to what causes operate in determining its predisposition for the white fibrous tissue, which enters into the composition of sheaths, fascia, fibro-serous membranes, and ligaments, and thus in particular affecting the joints.

It is believed that the poison circulating in the blood is lactic acid. Dr. Prout first pointed out that the blood contained a superabundance of this acid; and the experiments of Dr. Richardson indicate that the injection of a solution of seven drachms of lactic acid to two ounces of water into the peritoneum of a cat induces, not peritoneal, but endocardial inflammation (especially of the left side of the heart), and fibrous deposits on the mitral and aortic valves. The lactic acid is supposed to be formed in the pulmonary circulation of the blood, and from thence carried into the left ventricle, to be propagated by the general circulation to the parts where the disease is really manifested. The fibrine appears to preponderate over the saline elements of the blood during the disease. Few opportunities have been afforded of examining the state of the parts affected when the attack is acute, as few people die of Rheumatism *per se*; hence the somewhat contradictory statements of different authors.

Rheumatism is most conveniently divided into acute and chronic; in the former, the general and local symptoms are well marked. There is usually a feeling of coldness, want of appetite, thirst, and more or less feverishness, attended on or caused by exposure to cold or wet; pain is experienced in one or more joints, and is followed by inability to move, and by swelling and great tenderness. The large joints are often implicated, but the disease usually attacks the middle-sized ones. Hence the knee, ankle, wrist, and elbows are the chief seats. The disease tends to shift from one point to another, and does not often remain fixed in the one first affected.

When the disease is thoroughly established, the pain is very severe, and is intensified by the slightest movement. The pulse is full and quick, and the fever is attended with a peculiar acid, copious, and sour-smelling sweat. This sweat seems neither to mitigate the fever nor relieve the pain. The bowels are constipated, and the urine is highly coloured, scanty, and deposits quantity of urates on cooling.

Unfortunately the disease is not limited to the joints. It has been found that in cases of acute Articular Rheumatism with high fever, the heart is affected by endocarditis or endopericarditis; and the foundation is laid for permanent chronic valvular disease. The cardiac complication is insidious, and frequently attended with no pain, and it is only discovered on examination with the stethoscope. While pneumonia is rare, pleurisy with effusion may complicate matters:—

The temperature ranges from 100° to 104° , gradually ascending for at least a week, and subject to considerable variations. Sometimes it reaches as high as 108° or 109° , and then death quickly ensues.

The duration of the attack varies from three to six weeks. Relapses are common, and although five to six weeks is the usual limit, the attack may extend over some months, as it has no fixed epoch for its departure. The termination is generally in recovery, but often a joint or joints may be left stiff, or may become chronically enlarged. The average number of deaths is usually 1 in 1000. Rheumatism is not thus so serious in itself as in the after-mischief, which it entails by cardiac and other complications.

The object of the writer was to ascertain, by a close scrutiny of results, whether certain remedies and methods of treatment confirmed claims made by their advocates, and to learn if any one possessed advantages over others in the cure of this most unsatisfactory disease. Having himself had charge of a fair proportion of the number, he will endeavour to supply whatever was omitted in the tables for want of space, etc.

The treatment may be briefly divided into alkaline and non-alkaline,—the latter including, as will be seen (*viz.*), Iodide of potassium, Colchicum, Opium and Guaiacum; Syrup of Lime should be added here as it is not fairly entitled to be classed among alkalies. The alkaline is that recommended by Dr. Fuller, somewhat modified, and defended by him with such

warmth whenever its efficacy is questioned. So much has lately been written on Rheumatism with a view of determining the value of this method, that my observations will be directed to two points only, the duration of the disease under this treatment as compared with the other, and the comparative exemption from heart complications in both.

I have recorded such cases only of cardiac affection as commenced after the patient might be fairly said to be under the influence of the treatment, and after the second day in the hospital. The House-Physician usually prescribes, if the case is well marked, as soon as the patient is admitted, so that no time may be lost by those who enter after the attending physician has made his morning visit. Of the entire number of cases (one hundred) eighty-nine were purely under alkaline treatment. Preceding the administration of alkalies, the state of the bowels always received attention, and a cathartic enema was given if necessary. The preparations used were varied somewhat, according to the preference of the prescriber, but in most cases salts of potash and soda were chosen. The quantities given, as will be seen in the tables, varied from \mathfrak{zss} . to \mathfrak{zj} every three or four hours during the first few days ; increased if not found to render the urine alkaline, and diminished where this had been effected.

In most cases two days were sufficient to produce this result. I have found it difficult to have larger doses retained ; and, indeed, one of the chief objections to this method is the irritability of the stomach and bowels to which the remedies give rise, when given in quantities of a drachm and upwards. I have been obliged frequently to diminish the amount recommended by Dr. Fuller, before getting the urine alkaline ; and even when administered largely diluted in barley or rice water, many of the female patients could not retain doses sufficient to produce any result ; consequently their use was discontinued.

Of the above one hundred cases treated by alkalies, during the existence of acute symptoms, and free from any discoverable

cardiac complication until the third day, eighteen developed disease of the heart during their stay in the hospital. Thirteen of these affections were endocardial, accompanied by the murmurs observed in those cases. Five were pericardial, and two of these under my own care terminated fatally. As these were the only deaths, either in the hospital or my own private practice, from Rheumatism or its complications, and both having been under alkaline treatment from the very commencement, my faith in its protective influence over the heart was somewhat shaken.

The details were briefly these:—A young woman, twenty-two years of age, strong, and previously perfectly in health, was attacked by rheumatism in joints and upper extremities. I saw her on the third day, and prescribed a cathartic of colocynth and calomel, and ʒss. each Acet. and Bicarb. Potass. in water, every three hours; Soda Bicarb. zss. in a pint of rice water, for drink; warm fomentations to be applied to the affected joints. No cardiac affection discovered on auscultation, and no pain on inspiration in any part of the chest. Five days after, she not having improved meantime, and other joints becoming painful and swollen, I prevailed on her to enter the hospital. Same treatment continued, with an occasional Dover's powder to relieve pain. The day after being admitted she complained of a feeling of soreness in the region of the heart, and a slight souffle was detected at apex. Strong Iodine was applied to seat of pain. Next day a distinct friction sound was heard, and the suffering on inspiration had become severe. The case went on. Effusion soon followed, attended with great dyspnoea; leeches, blisters, diuretics, tonics, stimulants,—the whole list of remedies were applied for the sufferer's relief, but without avail. She died after two weeks.

Number 2 was a man of thirty-five years of age, suffering for the first time from acute Rheumatism of a very severe form, most of the large joints being affected. Admitted to the hospital the

sixth day of the disease, joints swollen, red, and painful; perspiration profuse and acid; urine high coloured; no affection of the heart. I remarked at the time to the House-Physician, "This is an admirable case for testing the value of alkaline treatment; let us carefully observe all conditions required by Dr. Fuller." The bowels were moved freely. Acet. and Bicarb. Potass. given in full doses; liquid nourishment, of milk, gruel, and beef tea prescribed, Anodynes of Hyoscyamus, and Bromide of Potassium at night. Urine became alkaline on second day; on fourth, patient began to develop symptoms of pericarditis, beginning with pain on inspiration and feeling of distress in cardiac region.

Friction sounds, effusion and its accompaniments of dyspnoea, delirium, etc., followed; active treatment failed to relieve the disease; local depletion, repeated counter-irritation, with the usual efforts to sustain strength by means of liquid nourishment in abundance and stimulants in moderation were tried. After a few days had elapsed, and no improvement manifesting itself, the administration of Quinine in doses of 5 grains four times a day, as recently recommended in pericarditis with delirium, was resorted to, but without any beneficial result. The patient died in seven days after the first manifestation of the disease. The other three cases fortunately recovered.

In such cases, I think an attempt should be made to evacuate the fluid by tapping the pericardium. I feel confident that the day is rapidly approaching when the use of the Trocar and Canula will become more frequent than at present in cases of distended pericardia, and that the amount of success will compare favourably with that obtained by Dr. Bowditch and others in the operation of Paracentesis Thoracis. I should certainly not hesitate, if all well recognized methods fail, to give the patient the benefit of the attempt.

At the same time that the above case was under my care, a patient of Dr. Bowditch, also under the Alkaline treatment, had a

severe attack of pericarditis, from which he recovered. I may be pardoned for detailing these two cases at such length, when it is remembered that special pains were taken in each to ensure a fair trial of the alkaline plan, and from the fact that both were very good specimens of severe acute Rheumatism affecting the large joints, and coming under treatment at an early stage of the disease.

Every hospital physician knows that the number of such typical cases coming during the term of service is not very large. He may have many Rheumatic affections, more or less severe, occurring in different constitutions,—nervous women, and broken down men—in which he knows that alkalies will not be beneficial, and wisely refrains from their use. But when such a case as Dr. Fuller takes as a specimen presents itself (St. George's Hospital Reports, Vol. 3, Art. "Treatment of Rheumatism"), he feels called upon to test fully the efficacy of active remedies.

The case of Endocardial complication had murmurs of various degrees of intensity. Of these the murmurs disappeared in half the number before the patients were discharged.

The average stay of patients at the Hospital under the Alkaline treatment, was twenty-four days. From this, at least, one week should be deducted, many of them remaining from ten to fourteen; and all seven days after the disease may fairly be said to have been cured. This gives an average of eighteen days as the duration of treatment, which, as will be seen further on, is much briefer than other methods. It should here be said, that all were placed upon some tonic, either Quinine, Iron, Cod-liver oil, or a vegetable bitter, after the discontinuance of alkalies. This, aside from its forming part of the alkaline plan, is absolutely necessary in the majority of those received into charitable institutions. The condition of the sick poor is essentially the same in all large cities, but I have often thought that the habits of life among our English firesides may have some effect in producing a more severely acute form of the disease, and one better adapted to

Alkaline treatment. This has been fairly tried, and is still continued in well-marked cases, indeed ; for such it is my favourite in both Hospital and private practice ; but we have failed to produce the results claimed by Dr. Fuller, either in procuring exemption from cardiac affections, or in curing the disease in eleven days.

It may be said that the quantity of Alkalies and neutral salts given were insufficient, but I have observed that very few stomachs can be made to retain the large doses said to be sometimes administered, without irritating the stomach and bowels and prostrating the patient.

The writer feels that simple justice to Dr. Fuller's plan would exclude the majority of these from being called strictly Alkaline treatment. Indeed, with the exception of the originator and a few others, the published cases treated by alkalies have always seemed to have had the treatment modified, very few physicians appearing to have given sufficiently large doses ; the reason undoubtedly being the tendency of large doses to impair the appetite, produce intestinal irritation and griping pain, and the effect on the blood. The plan is a good one where the cases are carefully selected, and I believe better results can be obtained in severe acute rheumatism in a robust subject than by any other yet known, but the class is small, and not such as have come under treatment in our hospital in large numbers. During the past few months, I have been successful in private practice in the class of cases mentioned above, very few lasting more than a week, and no case showing any heart complication. Undoubtedly, more carefully selected cases in the future, and stricter attention to the rules laid down by Dr. Fuller recently, will be attended with better results.

There were treated under the Non-Alkaline plan one hundred and five cases of well-marked acute rheumatism. The remedies were various, and such as have been prescribed for years. A glance at the tables will show the nature of the treatment, and

mention the principal remedies used. These were chiefly, Iodide of Potassium, Colchicum, Opium, Syrup of Lime, a few cases of Herbert Davis's blistering treatment, and a number in which the Alkaline treatment failed to relieve. Among the number, eighteen had some form of heart complication appearing on or after the third day in the hospital. These were chiefly endocardial with mitral murmurs. There were no deaths, except the two mentioned above, under Alkaline treatment. In five of those treated under this method with cardiac complications, the murmurs had disappeared at the time of discharge; under the Alkaline it had disappeared in seven.

The average stay of these cases in the hospital was thirty-five days. From this seven to ten must be deducted, leaving the duration of treatment twenty-five days. This is scarcely a flattering result, and suggests a doubt as to the benefit arising from the administration of drugs. Certainly, in view of the recent statements of Drs. Gull and Sutton, and the success attending their treatment without drugs, we have not done so well for patients either in abbreviating their stay in the hospital, or saving them from more or less severe heart complications.

Glancing back over the list of remedies, each claimed in its day to be almost a specific, and each in turn falling into disuse, the practitioner finds his faith in the curative effect of medicine in this disease very much shaken. The Alkaline treatment commends itself as rational, and one from which much might be expected, in view of the acid condition of the system, but results almost equally good have attended the use of Bromide of Ammonium, by Dr. De Costa, where this condition was not affected.

For a time, during the warm months, many cases seemed to improve rapidly under the syrup of lime, recommended by Dr. Buckingham, but it was still discontinued, either on account of creating gastric disturbance, or not materially modifying the disease. Dr. J. B. Upham gave the blister treatment a very fair

trial in several, but the manifest inconvenience and even danger attending it in cases where many large joints are affected, preclude its general use. In those so treated, the pain was relieved for the time, but returned in the course of a few days with less severity, and continued about the average time. Its protective influence over the heart we could not fairly estimate in the small number of cases treated; none of them, however, showed any tendency to cardiac affection.

It should be mentioned that in every case due attention was paid to local treatment, either by the application of Opiated alkaline lotions, Iodine, Laudanum, Hot Sweet Oil, Sulphur on cotton batting with an outside covering of thin rubber cloth, Aconite, Chloroform, Salicylic wool, etc., etc., according to the experience of the prescriber.

We found that, when a single joint only was affected, encircling the limb in its neighbourhood with blistering plaster, and producing decided vesication, will in most cases give prompt relief, if it does not permanently cure.

I think the administration of large doses of opium in inflammatory affections, both of mucous and serous membranes, and also of the fibrous tissues, is a decided success. The errors, however, to be considered, are, particularly in the treatment of inflammation of mucous membranes, to consist in giving too small a quantity for a dose, by which the secretion from the inflamed surface (Nature's relief of the disease) is checked, without the inflammation being subdued. We should, then, contrast the effect of Opium in the treatment of acute rheumatism, with other remedies, which are particularly relied on, such as Colchicum, Emetic-Tartar, Salicylic of Soda, and we will find that opium is generally most effective, and there is less danger of relapse, or what is worse, metastasis, under its employment. When it produces systemic disturbance, Calomel should be combined with it, and use made of moderate bleedings, and I recommend this combination where the fibro-serous membranes are implicated.

Opium should always be increased in dose, both as to frequency and quantity, until the patient feels decided relief, and should be then kept up at that dose until the disease is steadily declining. The first indication that tells the practitioner that he has reached the proper dose is the statement of the patient, who, in reply to an inquiry as to how he has passed the night, probably says that he has not slept, but that he is free from pain, and feels comfortable. This effect having been attained, the Opium may then be continued in repetitions of the same dose as to frequency and quantity. Colchicum, aided by moderate depletion and antiphlogistic regimen, is generally successful, although obstinate and even dangerous diarrhoea attends its use, and by no means should it be considered either the most certain or most safe remedy. Tartar-Emetic has also been tried, in larger doses even than Drs. Laenner and Lewis employed (*viz.*), a grain every hour for many consecutive hours. The first dose or two were usually vomited, but if tolerance then ensued the cure was often astonishingly quick, in cases even of many days' prior duration. Diarrhoea sometimes occurred, but it was generally easily arrested. It failed in its effects, however, in more than two thirds of the cases. On the whole, it appears evident that while the Tartar-Emetic administered in large doses occasionally displays a singular and extraordinary control over acute rheumatism, we are yet at a loss to determine in what cases it is more particularly successful, or how its influence can be more extensively applied.

Dr. Griffin has, however, in some cases of rheumatism found stupor, headache, and constipation (although in many others the bowels continued regular); this being the case, a plan recommended by Dr. Hope should be tried (*viz.*), as follows:—This consists in the administration (after one or two bleedings in the robust only) of grs. v and x Hyd. Sub. with $1\frac{1}{2}$ and (two) 2 gr. Opium every night, and a purgative which will act four or five times at least every morning. The following draught, given thrice daily, expedites the cure:—R. Vin. Colch. \mathfrak{m} x—xv., Pulv. Ipecac.

Co. grs. v, M. Larin ʒx, Syrup ʒj. M. When the pain and swelling are much abated, which usually appears within two days, and almost always within four days, and before this, if any tenderness of the gums occurs, the Calomel should be omitted, continuing one grain of Opium at bed-time, and in some cases at noon, as also the draught of Colchicum and morning Sena purge. When a sore mouth supervenes, the cure must, and will have to be completed by the Opium plan; or, if there is not much pain left, by Quinine and Potass. Hydr.

Salivation can never occur in these cases, any more than in abdominal inflammation, or in cholera, unless the use of Calomel be persevered in after the symptoms have completely given way and a cure in part effected. So long as acute disease lasts, Mercury will not salivate, but a single dose given after the disease has given way may do so; and the difficulty of avoiding it generally arises from the influence of our own apprehensions, which tempts us to continue the remedy beyond the absolute necessity, for fear of a relapse.

Disease of the heart is rare under either of these rules of treatment; but when discovered, large and repeated doses of Calomel and Opium are essential. When the Rheumatism threatens a chronic form, or the attendant fever assumes a hectic character, Quinine or the Hydriodate of Potass. in full doses are of great use.

CHAPTER II.

ON THE MODUS OPERANDI OF COLCHICUM IN ACUTE RHEUMATISM.

In the treatment of rheumatism, Colchicum is to be generally relied upon ; but should many joints be affected, and the fever and inflammation run very high, then blood-letting and mercurial purgatives must be superadded. When the pain is of a nervous character, then opium or morphia are useful. Colchicum does not cure Rheumatism by acting as a purgative, but it operates chiefly by assisting the kidneys in the elimination of morbid matter. I have not the slightest doubt that it acts chiefly in promoting the elimination of excrementitious matter through the kidneys. If you have general opportunities of observing that, as the patient is getting better, the urine is increased—either in quantity or specific gravity—or in both : sometimes there has been a copious deposit of lateritious sediment, and this is the most favourable case, but is not essential, for in other instances the excrementitious matter is eliminated in the form of dissolved urea, and then there is no deposit. This, I believe, is the true mode in which Colchicum cures rheumatism and Gout ; and this explains why it acts most favourably when it does not disorder the bowels *N.B.*—After the pain and inflammation has subsided, it is necessary to continue the Colchicum for a week or ten days, to get rid of the rheumatic matter from the system. It should be combined with a mild Tonic, and afterwards Iodide of Potassium should be substituted, and the patient's diet should be likewise improved.

One of the most remarkable effects of Colchicum was discovered by Chelius, of Heidelberg. He found that the uric acid con-

tained in the urine of those taking Colchicum was nearly doubled in the space of twelve days. In one case the urine before taking Colchicum contained 0.069 per mille of uric acid ; four days after commencing to take the Colchicum the proportion was 0.076 ; on the eighth day it was 0.091 ; and on the twelfth day it was 0.102. In other instances he obtained similar results.

The urine of a patient taking Colchicum was, some time ago, examined by Dr. Christison, and he found that in two days the quantity of urea was nearly doubled. In the urine before taking Colchicum there was no deposit of the lithate of ammonia. Its density was 1020. It contained about forty-seven parts of solid matters to the thousand, and of this quantity twelve parts were urea. The specimens of urine passed on the first and second days after commencing to take Colchicum were exactly alike. They were very turbid, and their turbidity disappeared with a gentle heat ; the deposit was evidently lithate of ammonia. The density of the first was 1033.5, and that of the second was 1034, which are both very unusually high for urine not diabetic. As they were obviously identical in their nature, Dr. Christison only analysed the second. It contained seventy-nine parts of solid matters in a thousand, and of this quantity thirty-five were urea. Dr. Christison suspected that the quantity of urea was even greater, for not having added an excess of nitric acid, some of the nitrate of urea might have remained in solution.

Through the kindness of Dr. Thompson I had an opportunity of examining the effect of Colchicum on the urine of a sailor who was a patient in the Royal Infirmary of Brussels ; he was under treatment for secondary syphilis, but was otherwise healthy. I was permitted to give him a few doses of Colchicum, in order that I might ascertain the physiological action of that agent on the kidneys, but before doing so I examined the urine. The density was 1025. It contained no deposit, nor was it affected by heat or Nitric Acid. It contained :—

Total solids	27.5000
Water	972.5000
Urea	12.360
Uric Acid	0.281
Inorganic Salts	7.436
Organic Matter	7.423
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Total - - - - -	1000.000

N.B.—Here it will be perceived that both the urea and uric acid were slightly deficient, if we compare it with the standard of healthy urine, as given by Becquerel. Density 1018.9 contains :—

Total solids	31.185
Water	968.815
Urea	13.838
Uric Acid	0.391
Inorganic Salts	7.695
Organic Matter	9.261
<hr/>	
Total - - - - -	1000.000

On the third day, after commencing to take the Colchicum, the urine was examined. It possessed a slight turbidity, which, however, was dissipated by heat. Density 1030. It contained :—

Total solids	29.650
Water	970.350
Urea	15.500
Uric Acid	0.491
Inorganic Salts	6.350
Organic Matter	7.209
<hr/>	
Total - - - - -	1000.000

Here, it will be observed, the urea was increased by one-fourth, the uric acid nearly doubled, and the organic salts and inseparable organic matters considerably decreased.

The urine was again examined on the sixth day after commencing to take the Colchicum, with the following results. Turbidity rather increased. Density 1034. It contained :—

Total solids	33.460
Water	966.540
Urea	18.341
Uric Acid	0.750
Inorganic Salts	7.436
Organic Matter	6.933
Total - - - - -	1000.000

Here, then, the physiological action of Colchicum in increasing the urea and uric acid was well marked. Having obtained these results from this case (which are only corroborations of many others), it was not considered justifiable to proceed further with the administration of Colchicum with this patient. It has been supposed that under the use of Colchicum a remarkable change takes place in the system, namely, that the uric acid becomes converted into urea ; but this has not at all been substantiated, and from the above cases of Chelius, and the analyses which I have just noticed, we must be led to suppose that no such change occurs, but that an increase in both those principles is the result.

The opinion of Dr. Graves is that the beneficial action of Colchicum is not owing to producing a more rapid excretion of lithates through the kidneys, but to the remarkable property that plan possesses of altogether putting a stop to the morbid formation of lithates.

The opinion of Dr. Gardiner is that he has always found that the increase of urea was accompanied by a corresponding diminution of the urates in the urine. But from the above experiments, I am inclined to believe that both of these suppositions are erroneous. Furthermore, Dr. Garrod states that in acute rheumatism no more urea and uric acid are to be found in the blood than in health ; this being a very minute quantity. I differ from this opinion, believing both to exist in an increased quantity. In the cases which I am going to relate, and which fell under my own observation, I shall endeavour to prove that such is the case, and to show, from the analysis of blood and urine which I made both before and after the exhibition of

Colchicum, that the remedial agency of this medicine is due, partly, at least, to its power of eliminating urea and uric acid from the blood, and increasing their quantity in the urine. The first case was that of a girl in Charing Cross Hospital; on the 13th of July a small quantity of blood was subtracted, analysed, and found to contain :—

In 1000 parts of blood $\left\{ \begin{array}{l} 0.507 \text{ Urea} \\ .865 \text{ Uric Acid} \end{array} \right.$

The urine was examined at the same time. It contained :—

Total solids	28.568
Water	971.432
Urea	10.496
Uric Acid . . . . .	.257
Inorganic Salts	7.0461
Organic Matter	10.354
Total	1000.000

Colchicum in combination with Muriate of Morphia was then administered.

The urine was again examined a week after the admission of the patient. It was found to contain :—

Total solids	31.459
Water	968.541
Urea	12.312
Uric Acid . . . . .	.421
Inorganic Salts	8.231
Organic Matter	10.495
Total	1000.000

The urine was again examined nine days afterwards. It contained :—

Total Solids	35.613
Water	964.387
Urea	13.984
Uric Acid . . . . .	.598
Inorganic Salts	9.401
Organic Matter	11.630
Total	1000.000

After twelve days constant use of the Colchicum, a small quantity of blood was procured for examination. Now, however, not the slightest trace either of urea or uric acid could be detected in so large a quantity as 3,500 grains. The urine was examined at the same time, and was found to contain :—

Total solids	34.554
Water	965.446
Urea	14.561
Uric Acid . . . . .	.737
Inorganic Salts	9.649
Organic Matter	9.607
Total	1000.000

The Colchicum being still continued, the urine was again examined, on the eighteenth day, and found to contain :—

Total Solids	38.128
Water	961.872
Urea	17.635
Uric Acid	1.034
Inorganic Salts	9.999
Organic Matter	9.460
Total	1000.000

The next case was that of a private patient. I had only an opportunity of examining the blood in this case once (*viz.*) before Colchicum was taken. It then contained :—

In 1000 parts	1.416 urea
„ „	691 uric acid

Before taking Colchicum the urine contained :—

Total Solids	23.479
Water	976.521
Urea	1.358
Uric Acid . . . . .	.097
Inorganic Salts	7.333
Organic Matter	9.091
Total	1000.000

The urine was again examined on the fourth, ninth, and thirteenth days respectively, and contained on the fourth day :—

Total Solids	24.538
Water	975.462
Urea	9.103
Uric Acid . . . . .	.231
Inorganic Salts	8.693
Organic Salts	6.511
Total	1000.000

On the ninth day :—

Total Solids	26.322
Water	973.678
Urea	12.981
Uric Acid . . . . .	.497
Inorganic Salts	9.400
Organic Matter	3.444
Total	1000.000

On the thirteenth day :—

Total Solids	27.466
Water	972.534
Urea	16.824
Uric Acid . . . . .	.937
Inorganic Salts	7.203
Organic Matter	2.503
Total	1000.000

These are the analyses of two very favourable cases, in which it will be seen, that the urea and uric acid are increased in proportion to the time that the medicine is continued. I have selected these two cases, from many others, on account of their showing the increase more gradually. In all the cases, however, in which I have analysed the urine, the great increase was distinctly marked, although, perhaps, not in so regular proportion. One other case I would wish to mention, in which the urea and uric acid, although they increased after a few days' use of the medicine, did not continue to do so subsequently in the same proportion.

The analyses were made before taking Colchicum, and on the third, sixth, and tenth day after its exhibition.

Before taking Colchicum :—

Total Solids	25.636
Water	974.364
Urea	7.684
Uric Acid . . . . .	.129
Inorganic Salts	8.421
Organic Matter	9.402
<hr/>	
Total	1000.000

On the third day :—

Total Solids	27.479
Water	972.521
Urea	11.158
Uric Acid . . . . .	.300
Inorganic Salts	8.303
Organic Matter	7.718
<hr/>	
Total	1000.000

On the sixth day :—

Total Solids	97.907
Water	972.093
Urea	15.660
Uric Acid . . . . .	.570
Inorganic Salts	6.500
Organic Matter	5.117
<hr/>	
Total	1000.000

On the tenth day :—

Total Solids	28.426
Water	971.574
Urea	15.730
Uric Acid582
Inorganic Salts	7.351
Organic Matter	4.763
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Total	1000.000

These analyses will show to what extent Colchicum will alter the renal secretion, by supplying it, when deficient of its normal constituents—urea and uric acid—from the blood.

I am inclined, from all this, to believe that to this property of Colchicum its remedial action is, in a great measure, to be referred. Further analyses of the blood may, however, be thought necessary, but neither time nor opportunity have afforded me means for this purpose. The thirteen analyses of the urine recorded above are only a few selected, from many others, made by me, and were effected according to Becquerel's method. Colchicum has been employed in all forms of the disease ; but it appears to me more particularly useful in articular rheumatism. In Dr. Watson's words, "Our wishes and our expectations from Colchicum are often doomed to be defeated." I believe that in proportion as the synovial symptoms predominate, or mix themselves distinctly with the fibrous—in proportion as the disease approaches in its character to gout—you may expect to be successful with Colchicum. Large doses are not requisite ; twenty minims of the tincture or of the wine may be given, every six hours, until some relief be obtained ; or a grain of the inspissated juice, or of the acetic extract of Colchicum, every four hours. Under this treatment the disease sometimes vanishes within three days ; the medicine producing sickness and purging, and the rheumatism or rheumatic Gout rapidly declining. Occasionally the same favourable event takes place, although there has been no disturbance of the stomach and bowels.

The cases in which Colchicum appears to me to be more pre-eminently useful are those in which the disease attacks the joints, and is of an erratic character—*e.g.*, suddenly disappearing from one joint, and as suddenly appearing in another—these, I believe, are the cases in which the heart and other internal organs are chiefly affected, and, probably, if the active operation of Colchicum is secured early these formidable secondary diseases are less likely to occur.

CHAPTER III.

ON THE USE OF COD-LIVER OIL IN ACUTE RHEUMATISM.

It appears to be particularly useful in all cases characterised by deficient action—as Phthisis, Chronic Rheumatism, Rickets, etc. It augments animal heat by supplying carbon to the system, and it also increases the coloured globules of the blood ; it is easy of digestion, and, like other oils, does not cause diarrhoea. Dr. Bradshaw has used Cod-liver Oil with success in the treatment of Chronic Rheumatism. One of his patients, as he observed, had been in the Indian army, and exposed to great hardships. At the battle of Seringapatam he was obliged to stand up to the middle in water for many hours, and from that day he never had a perfect use of his limbs, and was racked with agonising pain, which he allayed with small doses of Crude Opium, which he swallowed from time to time, without which life would have been unsupportable. Train oil was suggested to this patient, to which he readily assented, declaring that anything was better to him, however obnoxious to the palate, than the constant pain he had endured. This was accordingly administered on a little gin, and the dose was augmented daily, until he was able to take the half of a wineglassful morning and night. The improvement was daily marked in the patient ; his countenance assumed, gradually, a cheerful aspect ; he rapidly gained flesh ; his bowels, which had heretofore been costive and troublesome, acted daily ; his sleep was refreshing ; he threw aside one staff, and then the other ; his physical energies by degrees returned to him ; and, he adds, he had the pleasure of seeing him, six months afterwards, with his gloves and mattock trimming the hedges of a neighbouring farmer,

with the full stress of vigorous manhood. I will here remark another such case treated by Cod-liver Oil. This was an old midwife, seventy-one years of age, of thin spare habit, and costive bowels, with *ordor urinæ*. She had been subject to Rheumatism forty years, and had taken sedatives for some time to allay her pain. The formidable nature of the case urged me on, however, and, with the patient's consent, I give the teaspoonful of Cod-liver Oil, as in the former cases, three times a day, increasing the dose until she could bear a full wineglass; but it is remarkable that the stomach revolted if given on any other vehicle but that of strong whiskey. The daily improvement here was equal to anything I had ever seen; she certainly appeared to grow younger; the constipation of the bowels subsided; the *ordor urinæ* was no longer troublesome; and this woman spent many years afterwards in the glories of longevity, attributing her happiness to the effects of the oil. *N.B.*—Although in many cases of Cod-liver Oil having cured Chronic Rheumatism, or relieve it, yet, I think, it should not be given in those cases where dyspeptic symptoms exist, since, in these cases, the alimentary disturbance often arises from the admixture of fatty matters with the contents of the canal; but where it is admissible, its use should be daily kept up for a month at least. Cod-liver Oil should be administered in various vehicles, as circumstances required, or the condition of the patient demanded—such as cinnamon and peppermint waters, thin gruel, milk, and the alcoholic potions mentioned in the former part of these notes, viz., whiskey. But I will give the preference to a thin infusion of linseed, flavoured with lemon-peel, and sweetened to please the palate (*e.g.*):—

R	Syrup Ferri Iodid	℥iij
	Mucilag. Acacia	℥j
	Syrup Limoni	℥ij
	Syrup Zingiber	℥ss
	Ol. Morrhnæ	℥viss

M. A tablespoonful thrice daily.

Another way for administering it will be as follows, viz., pour a small quantity of lemon infusion into a glass, on which is added the oil, and, again, another infusion of smaller quantity upon it. In this manner the dose may be swallowed, and will slip down without offending the palate, and generally is well retained even by irritable stomachs. Another mode has been successful where many have failed, and will be found equally valuable—it is the yolk of an egg beat up with boiling water and sugar, with which may be mixed a dessert-spoonful of brandy, and on this the dose may be given without producing that nausea so frequently experienced when conveyed by other vehicles.

CHAPTER IV.

PHOSPHATE OF AMMONIA IN CHRONIC RHEUMATISM.

The testimony in relation to the treatment of Rheumatism is conflicting and contradictory in the extreme. While one author says that Colchicum is a specific in either Gout or Rheumatism, another avers that it is sovereign in Gout alone, and that its reputation in rheumatism is ill deserved. Another author considers this remedy efficacious in synovial, but of no service in the fibrous, form of rheumatism. One writer extols topical applications in the acute form of these diseases, while another pronounces them fatal.

Rheumatism and Gout are considered by some authors to be identical in character, while others declare them to be widely dissimilar. Both diseases, however, are frequently associated with what is called the uric or lithic acid diathesis; and when an individual labours under an acute attack of Rheumatism or Gout, his recovery is generally preceded by a redundant deposit of lithic acid in his urine.

The blood, I need hardly say, is a highly complex fluid, which in its most normal state consists of many heterogenous components, nutritive and excrementitious, a certain quantity of which—rather indefinite it is true—is necessary to support the life of the individual. Among the nutritive constituents are, according to Brown-Séquard, the serum, corpuscles, and oxygen; the excrementitious are chiefly the CO_2 and probably fibrin. Pasteur has, however, since “conclusively proved that the fibrin is not so necessary to the restoration of vitality in cases of blood substitution.” (*Vide* Billroth, Surgery, Sydenham Society; translations vol. I., p. 54)

By what mode this acid is eliminated, or what accident it is that determines its separation, we are now unable to say; it stands merely as an isolated fact, that by some chemical or vital change taking place, uric acid is separated in great quantity, and the individual is relieved. The urine in the course of such an attack may be examined and found as clear as water, and the fluid passed ten or twenty hours after so loaded with lithic acid as to resemble the washings of a wine-cask, or a beer-barrel. From whence is this enormous quantity of lithic acid so suddenly derived? Not from any sudden defect of assimilation occurring in the course of the disease, or from the solids of the body. It is most likely, then, derived from the blood; but the uric acid cannot have existed there in a free state, or it would have been passed from day to day. If, then, it existed in the blood, it must have been in a state of combination with soda, or lime, or both. And this is the more likely, when we reflect, that the concretions and thickenings which take place in the fibrous, cartilaginous, and white tissues generally, as before stated, are owing to the deposit in them of soda and lime, in variable proportions, with lithic acid. Taking into account these two prominent facts above stated, namely, the excess of lithic acid found in the urine at the time and period of convalescence from an attack of Rheumatism or Gout, and the subsequent deposit of soda and lime in the white tissues, it occurred to me, that during the existence of these diseases, the lithic acid might exist in the blood in a state of combination with soda and lime, in the form of insoluble compounds, which the skin and kidneys refuse to eliminate. If, then, any agent could be found capable of decomposing the lithates of soda and lime existing in the blood, and of forming in their stead two soluble salts, which would be voided by the kidneys and skin, we should thereby get rid of the excess of fibrin in the blood, the symptomatic fever, and the rheumatic and gouty inflammation, wherever seated, which have been excited by the presence of these insoluble salts. It occurred to me that phosphate of ammonia might be the

agent, provided it could be given in doses sufficient to answer the end without producing any unpleasant physiological symptoms. If our theory were true, phosphate of ammonia seems to be the proper re-agent, for it will form, in the place of the insoluble lithate of soda, two soluble salts, the phosphate of soda, which is remarkably soluble, and the lithate of ammonia, which is also soluble, and both capable of being readily passed by the skin and kidneys. The excess of uric acid would thus be got rid of in the form of lithate of ammonia; and the soda, floating in the round of the circulation—instead of being deposited, as it were, like an alluvial formation in the substance of the fibrous and cartilaginous tissues—would be taken up by the phosphoric acid and eliminated from the circulation. Based on this theory, I determined to try this Salt, and it was not long after that a favourable opportunity presented itself. In one case I prescribed as follows:—

R. Ammonia Phosphate . . . ℥ss
Aque Dist. : ad. . . . ℥vj

M. A tablespoonful every four hours, "combining it with doses of musk."

This was attended with complete relief in thirty-six hours. In another case I prescribed:—

R. Ammon. Phosphate . . . ℥j
Aque ad. . . . ℥vj

M. A tablespoonful every six hours.

Three days after the patient was recovering and that very hopefully: in this case the ammonia was the only remedy used. In another case Phosphate of Ammonia was given, with good effect, in ten-grain doses, thrice daily, for several weeks. In many Hospitals the Phosphate of Ammonia has been used in Chronic Rheumatism with great and beneficial results. The conditions in which it had been administered have not been so accurately noticed that I could report those cases so as to satisfy others. But the impression made upon my mind is, that it is in these cases the best medicine I have ever employed—for in many of these cases

the patient had undergone for years various modes of treatment without benefit—and all were relieved, in some degree, under the usage of this agent, when iodide of potash and other means had failed. In reviewing the cases which I have published, it will be noticed that thickening in the white tissues, of long standing, has disappeared under the continued use of Phosphate of Ammonia. Now it is in such cases that the lithic acid diathesis generally prevails, and this agent seems to act here, by depriving the blood, for a long time, of uric acid and soda, thus creating a demand for those elements in that fluid, and thereby bringing about a re-absorption, as it were, and solution of the superfluous lithate of soda which is deposited in the white tissues. As a result of Rheumatism, we sometimes see Arthrosis of long standing, where the joints are deformed or dislocated from transformation of tissue; and in Gouty subjects we find calcareous deposits, often crippling the joints and interfering with the free play of the tendons. In such cases we cannot hope for relief from this, or any other agent, but we may relieve the acute attacks which intervene in those chronic cases, and thus save suffering to the patient, and prevent the increment or calcareous deposit. I have reported those cases only of acute Rheumatism, in which the Phosphate of Ammonia was, for the time being, used as a single agent, believing that these would prove more satisfactory to the reader; but I would not be understood as advocating the exclusive use of this remedy; to do this will be the work of an empiric. The leading remedies should be adopted here, as they are in "Pneumonia," in which disease the lancet is not dispensed with, because antimony is used. Notwithstanding the efficacy of this last remedy is universally acknowledged.

In acute Rheumatism the disease is seated in the blood; but then there are painful symptoms related with the alteration of this fluid, such as local pain, heat, and swelling in some part of the body, and increased force in the circulation; anodynes will mitigate the one, and the lancet moderate the other, until the

primary indication is fulfilled in restoring the blood to its healthy condition. In the case of a boy, aged thirteen, who suffered with acute Rheumatism in the shoulder and back of the head, and in whose case there seemed to be some implication of the pneumo-gastric and glossopharyngeal nerves—there being difficulty in deglutition, great aversion to drink and irritable stomach—cups were applied to the back of the head, and the following remedies were given with the most perfect relief :—

R	Tinct. Digitalis	ʒj
	Pot. Cyanide	grs. ij
	Tinct. Hyoscyami	ʒij
	Ammon. Phosp. . . .	ʒiv
	Aquæ ad.	ʒiv

M. Two teaspoonfuls every three hours.

In the case reported, it may also be observed, that in every instance in which lithic acid was present in the urine, it at once disappeared under the use of Phosphate of Ammonia ; and that in all those cases of Rheumatism and Gout which in ordinary circumstances we might very naturally have looked for a lateritious sediment at the period of convalescence, the urine was remarkably limpid and free from precipitate of any sort. Under both circumstances the lithic acid must have been involved in the form of soluble lithate of ammonia ; the other element of the salt given having united with the soda of the blood, and formed the phosphate of soda, which was also eliminated in a state of solution. From the rapid disappearance of lithic acid from the urine in each case in which this salt was administered, we are led irresistably to the conclusion, that the Phosphate of Ammonia must prove the best agent for dissolving uric acid calculus. I have thus far had no opportunity of testing its efficacy in this respect, but we know that the common uric acid deposit is nothing more than a collection of very small crystals, each of which is a very minute calculus, and that it is nothing but an assemblage of those particles which enters into the composition of the ordinary uric acid stone.

When, therefore, these particles are collected into a mass in the pelvis of the kidney, ureter, or bladder, it is only necessary to saturate the fluids of the body with the Phosphate of Ammonia a sufficient length of time, and the calculus, however large, must be decomposed. When the lithic acid is combined with ammonia—a form of calculus sometimes met with—the phosphate of soda must answer a better purpose; and where the calculus is triple in its composition, the Phosphate of Ammonia and soda will, no doubt, be found to answer a better purpose than either of the single salts.

How is it that the valuable researches of Ancell, Christison, Andral, and Gavarrett, Prout, Liebig, and lastly, those of Franz Simon, should have furnished so few practical suggestions? For the last five years the Medical Press has been teeming, and still teems, with articles on the morbid condition of the urine, hæmatology, and animal chemistry generally, and yet how very few practical results, or even hints, have grown out of these numerous investigations and discussions. Those who have devoted their labour to the subject of hæmatology have given their attention too exclusively to the organic constituents of the blood, and have bestowed their pains on inquiring into the relative proportions of the chemical ingredients of this fluid. We have information, valuable and conclusive, as to the abnormal alterations in the quantity of fibrin, globuline, albumen; but as to the excess or deficiency of soda, lime, magnesia, iron, urea, and uric acid in the blood, in different pathological conditions, we are not so well informed.

For example, Andral, in his immortal treatise on the blood, has established the fact beyond the power of contradiction, and contrary to the previous belief of the whole medical world, that in certain forms of anæmia the fibrin is relatively increased over and above the normal standard. But he does not tell us at the same time whether the iron contained in the blood is increased or diminished in quantity in this condition. And yet from the fact that the preparations of iron seem, more than any other

remedies, to relieve chlorosis and anæmia, it is very natural for us to suspect that this abnormal condition may result from a deficiency of iron in the blood ; this, however, may not be the case, for probably the action of iron in this condition is vital rather than chemical. But still an inquiry into the actual amount of iron would at once establish or refute the assumptions. On the other hand, those who have examined the morbid conditions of urine have, we think, fallen into an error also in regarding an excess of salt found in this fluid as a disease in itself ; instead of which the presence of any abnormal ingredient ought to be regarded rather as an expression of disease, or an index of the morbid condition of the fluids, or of the system generally. The elements composing a calculus in the pelvis of the kidney are, in point of fact, just as much without the body as if they were in a basin. It is unphilosophical to suppose that the kidneys can elaborate a salt without having derived the materials of such salt from the blood ; and the inquiry is at once suggested, What part has the salt (which may be found evolved by the kidneys), or the elements of its composition, played in relation with the other ingredients of the blood from which it has been derived ? As, for example, it has been attempted here to prove that the matter of Rheumatism and Gout is an excess of lithate of soda in the blood, and the action of the phosphate of ammonia in the case in which it has been tried goes far to establish the proof. It is reasonable to suppose, then, that the presence of lithate of soda in the blood determines the formation of the excess of fibrin which is found in this disease ; and why may this not be the case whether the conversion of fibrin into albumen, or the reverse, be either a vital or chemical act ? If the conversion of the one into the other depends on the laws of life, then the presence of lithic acid, or its combination with other ingredients, is as foreign to the normal constitution of this mighty fluid, and capable of changes quite as great in the living elements of the blood as we see a sequestrum of any foreign body produce in the organized tissues

which surround it. And if, on the contrary, the conversion of albumen into fibrin is accomplished through chemical agency, still the lithate of soda may play a part in bringing about this change, analogous to that which is affected by various agents, when brought in relation with different organized matters, as in the conversion of oil into a material resembling spermaceti, or the influence of a single drop of oxalic acid in changing a large quantity of thick syrup into a thin saccharine fluid. So that, whether the agency of urate of soda is purely vital, or chemical, or partly both, its presence in the blood may play a part in relation to the other elements of this fluid resembling that which the sequestrum is seen to do in the one case, and the drop of oxalic acid in the other. And thus each chemical ingredient of the blood, from its excess or deficiency, or by forming new compounds in different diseases, may, through vital or chemical agency (as before explained), modify the quantity or consistency of the organic elements of the vital fluid. But again, through vital or chemical agency the fibrin and albumen are mutually convertible into one another, each in its turn retaining its proper vital integrity, and primary chemical composition, as to the due proportions of oxygen, nitrogen, carbon, and hydrogen, which enter into its formation. Now an excess or deficiency of some chemical ingredients of the blood may so modify this process as to cause an abnormal formation to take place. This new formation may only differ from fibrin in some slight alteration in the proportion of its ultimate elements and its unfitness for the purpose of the economy in health. But further, the fibrin in this abnormal condition may, for aught we know, constitute the matter of tubercle which, wafted in the rounds of the circulation, may be arrested in any of the tissues of the body, and there becoming endowed with new vital properties, take the form of gray semi-transparent particles which are first recognized by the aid of the microscope. And so an abnormal matter, similar in its mode of formation, but differing again as to its ultimate composition,

may lay the foundation of the disease of Bright. It may be said by some that the physical appearance of these deposits is so very different from anything met with in the blood, that such an idea is absurd. But it may be said, on the other hand, that honey is very different in its physical properties from wax, and so is oil from spermaceti, and yet, chemically, they are so very similar, that it is extremely difficult to point out any real difference.

Indeed, anyone at all familiar with organic chemistry is only too well aware, in making an analysis, of the trivial accidents which often intervene in similar processes, to bring about different results ; and he can readily see how an excess or deficiency of any one of the chemical ingredients of the blood may modify the organic elements of that fluid, and thereby convert them into materials for diseases of the solids.

CHAPTER V.

ACETATE OF POTASH IN CHRONIC RHEUMATISM.

Many cases have been lately brought forward in which this disease has been treated with various remedies, as Colchicum, Acetate of Potash and Nitrate of Potash, and lemon-juice, respectively. The treatment of acute rheumatism by Acetate of Potash is the more interesting, as involving the truth of explanation as to why this diuretic salt should be useful in rheumatism. Well, after giving a detail of the solid matters found in the urine whilst the functions are in a normal state, I should therefore add the researches of Wohler have shown us something more—(viz.), that whatever substances exist dissolved in the blood not necessary or fit for the repair of the structure of our frame, invariably escape from the body by the kidneys. The injection of saline bodies, colouring matters, etc., readily proves Wohler's statements. The lecturer mentioned, a little further on, that the septic agents do not reappear in their original form, but that they undergo metamorphosis; and proceeds in these terms:—"Can we at will, by therapeutic agents, produce this depurating effect, and by hastening the metamorphosis of matter, aid the removal of a *materies morbi*, whether itself the exciting cause or effect of antecedent action? Before stating which are the therapeutic agents most likely thus to depurate the blood, we should mention that efficacy I ascribe to the increase in the secretion of the kidneys: It will be found that the increase of water does not escape alone, but there is really washed away with it a certain, although not very large, quantity of solid debris."—"This is a key to the cures effected by many mineral springs." "I would press upon the

practitioner the importance of directing his attention to diuretics, not as merely helping the pumping off of the water, but as renal alteratives, as remedies aiding the removal from the body of injurious matter." The diuretic to which I will give the preference for removing the *materies morbi* in acute rheumatism is Acetate of Potash.

The first case I will mention treated by this drug was a girl, sixteen years of age, of sanguineous temperament, who traced her attack to sleeping in a kitchen underground. The disease commenced in the right ankle, soon reached the knee, and gradually attacked the left limb as well as the shoulders. She was thus labouring under inflammation of the principal joints when admitted into the hospital, at which period she presented the following symptoms:—Skin hot and dry, tongue slightly furred, pulse quick and full, and slight headache. The wrists, knees, and ankles swollen, stiff, and painful, and yielding a dry rubbing sound on being moved. Bowels and catamenia regular; appetite tolerable; sleep very indifferent. In this case I ordered twenty-five grains of Acetate of Potash to be taken every fourth hour, in camphor mixture, and eight grains of Dover's powders at night. The patient was very much better on the third day; she moved her wrists with facility, and without pain, the skin had become moist; she slept better, the bowels acted once a day; and the appetite was improved; pulse the same as before, and tongue more furred. The medicine was continued, and on the seventh day the ankles were free from pains, though the arms became somewhat stiff and swollen, all the other symptoms improving. On the fourteenth day the pulse was natural, and the patient quite free from pain in any joint, the appetite was very much improved; and to each dose of the Acetate of Potash, hitherto regularly taken every fourth hour, four grains of Ammonia Citrate of Iron were added, and the girl was desired to get up for two or three hours a day. The latter injunction was carried out to a greater extent than had been prescribed, and the conse-

quence was a slight relapse on the seventeenth day ; this, however, soon gave way, and on the twenty-first day the patient was discharged quite well.

The second case was a married woman, twenty-nine years of age. Five days before her admission she had got very wet, and the same evening the right wrist became painful and swollen. The next day the knees and subsequently the shoulder of the same side became similarly affected. On admission the right shoulder, wrist, and knee were exquisitely tender, as well as swollen and painful ; the cheeks were flushed ; there were headache, and sour-smelling perspiration ; tongue covered with a dry white fur, and red at the tip and edges ; pulse quick, full and bounding ; urine turbid and acid ; great restlessness, and no sleep for several nights. I then ordered half-a-drachm of Acetate of Potash to be taken every fourth hour, in camphor mixture, and ten grains of Dover's powder at night. The doses were somewhat larger than in the preceding case, both probably on account of the difference of age and the severity of the symptoms. As the joints were so exquisitely tender, soda poultices (the ordinary linseed poultice, made with a solution of carbonate of soda instead of plain water), were applied to the affected articulations. On the third day the patient was considerably relieved ; the bowels were, however, confined. Calomel and Colocynth were ordered, and the Acetate continued. The improvement was steady and gradual ; and on the sixteenth day all the joints were well, with the exception of a little stiffness about the shoulder. The patient then took two grains of Disulphate of Quinine three times a day, and was soon quite well. The urine was in both cases considerably increased in quantity. It will now be necessary to inquire for what reason I prefer the Acetate of Potash to other diuretics ? The undermentioned will explain : (*e. g.*) Squill, Copaiba, Broom, Juniper, etc., merely increase the fluids, and are useful in dropsy. Remedies which exert no chemical action on organic matter out of the body appear to be incapable of augmenting the quantity of

solids in the urine, and hence are of use only in the elimination of water ; they may and do act as renal hydragogues, but not as renal depurants. We have next to notice those remedies among the reputed diuretics which increase the metamorphosis of tissue, and act as depurating agents. This class includes the alkalies, their carbonates, and their salts, with such acids as in the animal economy are capable of being converted into carbonic acid, including the Acetate, Tartrates, and Citrates of Soda and Potash. These remedies act all alike—they all actively stimulate the functions of the kidneys, and increase the bulk of the urine, but they do more—they actually increase the metamorphosis of tissue by, in all probability, a direct chemical action on the elements of worn-out and exhausted tissue or other matter in the capillary laboratory of the body. As to the Nitrate of Potash, I have found it inferior to the Acetate of the same alkali. The latter I have used with much advantage, as I find the quantity of fluid removed from the body by the Nitrate of Potash is far less than that which is carried off under the salient influence of those agents which act more energetically on animal matter.

CHAPTER VI.

LEMON JUICE IN ACUTE RHEUMATISM.

Lemon juice has not gained so favourable notice as it deserves. This, I think, is owing to its administration in cases which experience has shown are but ill-adapted for its exhibition. From the experience I have, however, had in the use of this remedy, methinks I have sufficient evidence before me to justify the opinion that there are certainly two forms of Rheumatic disease which cannot be benefitted by the administration of lemon juice. The first of them is generally observed in cachectic subjects, and for want of a better name I shall call it Cachectic Rheumatism. It occurs in all classes of life, but commonly, I believe, among the lower orders. It is more frequent in females than in males. The swelling and redness of the parts affected are less marked than is generally the case in acutely painful rheumatism. The pain is, however, very severe, and occasionally partakes of the neuralgic character. The patient is sometimes anæmic, and on inquiring we may perhaps discover a history of long mental or physical suffering. The skin is perspirable, the pulse weak and rapid; the tongue varies, being sometimes moist and white, and sometimes clean and less moist than natural. In cases of this description I have not succeeded in relieving the patient by the exhibition of the juice; and if occasional relief has been obtained, the disease has shown a tendency to relapse, and becomes unmanageable under a continuance of the remedy. It may perhaps be well to mention that in these cases I have derived the greatest benefit from the exhibition of Opium in full doses at intervals. The other form of Rheumatism in which I have failed to obtain relief

by the administration of the juice is that attendant on syphilis. In all cases in which I have made trial of it among the female out-patients at the University of Louvain, Belgium, it has failed to exert any beneficial influence. The nature of the disease, so distinct from that of ordinary rheumatism, never indeed gave me any great hope of success. If we except the diseases above described, and cases simulating rheumatism, but really connected with ordinary dyspepsia, or, as is sometimes the case, with the existence of Bright's disease, my continued experience has but the more persuaded me of the great value of lemon-juice as a remedy for Rheumatism. Its action is sometimes most remarkable, causing cessation of pain and decrease of swelling and redness, such as we can rarely obtain with Colchicum, even when administered in large and hazardous doses. That lemon-juice sometimes fails to effect this rapidly is certainly true, and that, too, with respect to cases identical apparently with those in which early benefit has been observed; but the history of these less favourable instances will generally bear comparison with the results obtained by the ordinary plans of treatment; and it is my full conviction that since lemon-juice has been introduced at the University of Louvain, Belgium, as a remedy for acute rheumatism, the period during which it has become necessary to confine patients so affected to bed has been materially lessened.

I am now anxious to direct attention to a class of chronic rheumatism and its cases, in which I have used lemon-juice with very great advantage. I allude to such as are connected with deposit of lithate of soda in and about the smaller joints, and which partake more or less of the Gouty character. I have met with great success in this form of disease by the continued use of lemon-juice in combination with small doses of the Tincture of the Sesquichloride of Iron, and in several instances have effected absorption of deposits which have resisted all other plans of treatment. A case of the above description was lately reported to me, in which little success attended the administration of lemon-

juice alone. The patient, a lady, had been a cripple for several years, and was eventually restored by persevering in the use of the remedy for six or eight weeks. Lastly, with respect to the dose in which the juice ought to be administered. Experience has shown me that it should be larger than I was at first inclined to consider necessary. In acute Rheumatism, from one to two ounces should be given every four or six hours ; and should pain be felt in the bowels, or diarrhoea occur, which is very rarely the case, four or five minims of the Tincture of Opium may be added to each dose of the remedy.

CHAPTER VII.

CASES OF RHEUMATISM CURED BY LEMON JUICE.

The lemon-juice which was employed, was procured from a wholesale confectioner; this was administered to the patients in doses from one to two ounces three times a day, for an adult, three to six ounces taken at a draught, and without any admixture (three times a day). It might be supposed that the patient would find some difficulty in drinking so large a quantity of such a sour liquid, but this is rarely the case, nor does it in general produce tormina, nor otherwise disagree with the alimentary canal. Instead of relaxing the bowels, as might have been expected, it renders them somewhat costive, so that it not unfrequently becomes necessary to exhibit an aperient. The juice produces no very decided effect upon the kidneys, merely tending by its quantity to promote their secretion. It increases cutaneous action, but to what extent it is difficult to determine, because in Rheumatism, a disease in which this remedy is chiefly useful, the complaint itself is marked by the occurrence of profuse perspiration. The only unequivocal effect which uniformly takes place, is a diminution in the number and power of the pulse, and of the heart's action. Whether it alters the character of the blood, or whether it affects the heart by diminishing nervous influence, the profession has not had an opportunity of determining.

We shall now allude to eight cases which were treated with lemon juice.

CASE I.

John W——, a tall and athletic young man, a dock labourer, aged twenty-two, was admitted into one of the wards of the Hospital with acute rheumatism. He had a white and coated tongue, profuse perspiration, thirst, a hard full pulse at 92 ; bowels costive. There were swellings in the knees and wrists, which were red and tender to the touch, and his debility was so great, that he was scarcely able to walk to his bed. The patient stated, on admission, that he had been ill for three weeks, and that he had suffered from a similar attack eight years before, which lasted for one month. There were no irregular sounds about the heart.

TREATMENT.—To take six ounces of lemon juice three times a day ; a drachm of rhubarb powder to be given on the morning following admission.

First day.—Bowels relieved ; pulse 76, softer ; patient has less pain in the joints ; to continue the remedy.

Third day.—Pulse 70, soft ; no pain or swelling in the joints ; patient is up and dressed ; he declares himself quite well, and requests to be discharged. He is asked to remain a day or two longer, to improve his general strength, but he declines, as he states, he is well able to work.

CASE II.

Samuel H——, aged nineteen, of slight form, a warehouseman, much exposed in his work to currents of air ; never before had any similar attack. For four or five days he has had slight swellings and tenderness in the knees and ankles. On admission into the ward of the Hospital, there was great swelling, redness, and intense pain of the right elbow-joint, extending both upwards, for several inches, and downwards into the wrist. The tumefaction was so severe, that it was a question whether the inflammation was not rather phlegmonous than rheumatic ; but the pains and swelling in the other joints settled this point. Tongue moist but

white ; pulse 116, full ; bowels regular : skin perspirable. To take six ounces of lemon juice three times a day. Diet low.

First day.—Pulse 100, softer ; bowels regular ; arm and elbow-joint much the same as yesterday. To go on with the remedy.

Fifth day.—Pulse 88, soft ; the pain and swelling of the elbow have decreased rapidly since the last visit, and are now very slight bowels still regular.

Eighth day.—No pain anywhere, but still some more stiffness of the right elbow-joint, which prevents the complete extension of the arm ; bowels regular.

Twelfth day.—Dismissed, free from all complaint, and having the full use of his right arm, the elbow joint of which has returned to its natural size. This patient required one dose of the compound rhubarb powder during his treatment.

CASE III.

James S——, aged twenty, a baker, much exposed to heat and cold in working at night ; never before had a similar attack ; has suffered for ten days pain and swelling of both shoulder-joints. Admitted into the Hospital, having great pain and swelling of both shoulders, but especially the left, so that he is very reluctant to attempt to raise his left arm. Pulse 108, hard ; skin hot ; tongue white and dry ; much febrile excitement ; bowels confined. Ordered six ounces of lemon juice three times a day ; fifteen grains of compound extract of colocynth to be taken at night.

First day after admission.—Bowels well relieved ; pulse 82 ; less pain ; to continue the lemon juice.

Fifth day.—Pulse 80 ; pain and swelling much abated ; to go on.

Eighth day.—No pain or swelling ; is able to raise both hands above his head, and, so far as regards the rheumatism, is well. Patient continues in the Hospital in consequence of a swelling in the groin, which was opened two days after his admission, and is

going on favourably. He required purgative medicine every alternate day while taking the lemon juice.

CASE IV.

John H——, aged twenty-two, single, a policeman, formerly a farm labourer, with florid complexion, light hair, and strumous appearance; habits temperate. The patient was attacked with acute rheumatism three years ago, but has since had good health, until within the last fortnight, when he began to suffer from his present illness. The inner side of each foot and ankle were first affected, and then the elbows and hands became swollen, red, and painful, in which case he was admitted into the wards of the Hospital. There was then a murmur heard on the heart's systole. Pulse 104, hard, strong, and incompressible; tongue coated and white; countenance congested; appetite gone; bowels costive; urine acid; specific gravity 1010; about one quart passed daily; perspiration profuse: pulse 92. Ordered six ounces of lemon juice three times a day.

First day after admission.—The pain and swelling of the elbows and hands decreasing. Ordered to continue the remedy.

Fifth day.—The lemon juice seemed to cause a little griping pain in the bowels, which were moved twice a day whilst its use was continued. The pulse 80, small, weak, and compressible. There remained not a vestige of pain nor swelling anywhere.

Tenth day.—Pulse still 80. No bruit heard, nor with the systole of the heart. The patient has been quite free from all complaint for several days. The pulse retains the same character as on the fifth day. Discharged cured.

CASE V.

William B——, aged thirty-five, a married man, employed as a waiter; temperate, intelligent, with clear complexion, dark hair, and having excellent ordinary health. Five years ago, in the

winter, he was laid up seven weeks with Rheumatic fever. This has been his only illness since childhood. Admitted into one of the wards of the Hospital. The knees, ankles, and the small joints of the left hands swollen, somewhat red, heated, and very painful on the slightest motion; chest healthy; heart normal; appetite good; skin hot and dry; urine loaded with lithates, scanty, about a pint daily; bowels regular. Ordered four ounces of lemon juice three times a day.

First day after admission.—To go on, the juice produced no uneasiness of the bowels, or diarrhœa.

Eighth day.—The pain and swelling having almost entirely ceased, the patient was ordered sesquicarbonate of ammonia, five grains; decoction of chinchona, one ounce, three times a day, that he might recruit his strength.

Ninth day.—Much better; the joints are entirely free, except the knuckle of the middle finger of the left hand, which is swollen, and this the patient attributes to pressure of the walking-stick which he uses to assist him in moving about the ward. His knees fail him from mere weakness; but they are free from pains. He is considered nearly well of the Rheumatism, but remains under treatment on account of inflammation of the right eye.

CASE VI.

Thomas M——, aged twenty-six years, a cooper by trade, admitted into the wards of the Hospital. Aspect phlegmatic; has been a hard drinker, but has otherwise lived well. His general health has always been good. Had syphilis about six years ago, but it was not followed by any secondary symptoms. About five months ago the patient was attacked with loss of power in the motor nerves of the right arm, probably Rheumatism. Three months afterwards he was discharged cured. About six weeks ago he was attacked with general rheumatism, and from that time has been unable to work. He has not, however, been under medical care, and has not taken any medicine.

Present symptoms.—Complains of severe pain in the back of the neck and between the scapulæ, which is constant, but increased on the slightest movement. Pulse 96; tongue slightly furred; skin hot and dry; bowels regular; has slight pains in the head; sleeps well, and is not disturbed by the pain during the night. Treatment—six ounces of lemon juice three times a day.

First day after admission.—The pain is much relieved. Pulse 76; skin moist. To go on.

The Fifth day.—The pain is much less severe, and is intermittent. Pulse 72, soft; skin moist and cool; bowels regular. To go on.

Eighth day.—Complains of want of sleep; the pain is now only felt on walking or moving the affected parts. Ten grains of Dover's powder every night, and repeat the lemon juice three times a day.

Eleventh day.—Complains of pains in the head, probably caused by opiate at night, which, as he now sleeps well, he is directed to omit, still, however, continuing the lemon juice.

Fourteenth day.—Patient can now move his head in any direction without the least pain. The uneasiness between the scapulæ, however, still continues when he moves his arm or walks. Ordered to omit the lemon juice, to be dry-rubbed between the shoulders on alternate days, and to take a draught of magnesia, with wine of colchicum, in mint water, three times a day.

Sixteenth day.—Is now free from pain, and having remained so until the nineteenth day, he was discharged cured.

CASE VII.

J. A. B., aged forty-six, married, a pew opener; a stout man, with fair, florid complexion, and grey hair. Has been a gouty subject for twelve years, within which period he has had four very severe attacks, at intervals of about two years and a half, which have stiffened his joints so that he can hardly hobble along. Having had, for three days, well-marked Gout, with much pain in

his left hand, he was recommended to take lemon juice, and on the evening of that day he took two ounces. On the second day he took six doses, each of two ounces, at intervals of about three hours.

On the third day he took five doses.

On the fourth day he took four doses.

On the fifth day four doses.

On Sunday, the sixth day, in consequence of having to attend to his duties in the church, he therefore omitted the lemon juice altogether.

On Monday, the seventh day, he took a wineglassful three times in the course of the day.

On the eighth day two wineglassfuls.

On the ninth day he took none.

On the tenth day he took one wineglassful, and then left the remedy off altogether.

His account of the effects is as follows :—

On the fifth day he began to get ease. On the following day his duties fatigued him much, but he had no pain. On the seventh day he felt a kind of shaking or throbbing in the hand, which lasted for several hours ; the hand then gradually became pliable, having been stiff before, and from that time he has felt quite well, the few doses the patient had on the eighth and on the tenth day being merely taken by way of precaution for fear of relapse.

His limbs, which had been long stiffened with Gout—the last attack of which confined him to his bed for many weeks—have become more and more pliant ; and he states that he has not felt so well for the last twelve years ; having a good appetite, sleeping well, and being able to move about without pain, and with tolerable freedom. He says that the lemon juice did not open his bowels, but that when he took twelve ounces in the day he had some griping pains. The patient has had no attack of Gout up to the present time.

CASE VIII.

Ellen ———, aged twenty, a florid young woman. Whilst in service she met with an accident from the fall of a box which struck her side. Two or three weeks afterwards she began to expectorate blood, and this continued for two months. She was then admitted into one of the Hospital wards, and continued under treatment for three months. During this period she continued to cough up blood, almost without intermission, to the extent of a quarter to half-a-pint daily. The catamenia, though regular, were scanty, and her complaint was regarded as dependent on imperfect menstruation.

Various remedies, as well as astringents and sedatives, as saline aperients, were tried with but partial success; and although the repeated application of leeches to the side was more efficacious, still the bleeding recurred for a month, when she began to take three-ounce doses of lemon juice three times a day. From that time she has had no return of the complaint. With this patient, as with all who have followed this treatment, the lemon juice had the effect of lowering the power and frequency of the pulse.

Of these cases which I have enumerated, it will be observed that the first got well in three days, the second in eight days, the third in eight days, the fourth in five days, the fifth in nine days, and the sixth in sixteen days. The seventh case, though not of the same complaint, is equally and wonderfully remarkable. Inveterate Gout, occurring in a man sixty years of age, was materially improved, and a renewed attack was subdued by a few days' employment of this perfectly safe remedy; and in the eighth case an obstinate hæmorrhage from the lungs was arrested and permanently cured by the same means.

Failure or, at least, a want of striking success, may be ascribed to the circumstances, that the doses administered have hitherto been too small, therefore a larger dose should be given.

ANECDOTICAL.

A gentleman, who had consulted me several months before called about severe rheumatic pains which he was experiencing. He was recommended to take lemon juice. From some cause or other the patient, however, did not take it; and after an interval of several months, being again visited by his rheumatic pains, he applied to a chemist for relief. The person in question told him he ought to try lemon juice, and it then flashed across his mind that this was the remedy I had long before recommended to him. The gentleman told the chemist he would follow his advice; but "What is the dose?" said he.—The chemist replied, "Half-a-pint (!) three times a day," and added that this was the quantity he himself had taken for a similar attack, and with the greatest success. The patient, a gentleman of a resolute spirit, unflinchingly took the quantity prescribed, which, however, he found it somewhat difficult to swallow, and, according to his own account, in three days he was well. On seeing him I asked of him what effect it had upon his bowels? and learned that the patient had been astonished to find that it did not disagree with him in any way, although his bowels were remarkably tender and easily put out of order. It was thus clearly proved that even eight or ten ounces of lemon juice taken at a dose were not productive of any ill effects.

From the depression of the circulation, caused by lemon juice in large doses, I think it is highly probable it will be found a very valuable remedy in inflammatory diseases in general. It should be administered in cases of pneumonia and pleurisy, as I think it will act as beneficially in these diseases as antimonials, and much in the same way—with the exception of the nauseating effects—namely, by lowering the circulation and promoting perspiration.

CHAPTER VIII.

ON LOCAL ANÆSTHETICS IN ACUTE RHEUMATISM.

My researches on the application of anæsthetics to the joints in acute rheumatism is as follows:—A moist compress, on which the agent is sprinkled, is applied and removed once in twenty-four hours, being enclosed by impervious bandages so as to prevent its evaporation. It is applied to each joint in succession as it becomes inflamed. Having so far experimented on various agents, I can decide in favour of the Dutch liquid. The relief afforded, as regards the local pain, is very decided, and lasts from six to eight hours according to the attack. The movement of the limbs is restored, and the swelling subsides, and the disease gradually declines in from six to eighteen days according to the duration and acuteness of the disease. The complications of rheumatism may be treated on the general principles at the same time.

CHAPTER IX.

OPIUM IN ACUTE RHEUMATISM.

The most important rule to be remembered in employing Opium for the cure of acute rheumatism is that a full and sufficient dose should be exhibited. I have heard of opiate treatment having disappointed some who have tried it. On inquiry, I have learned that in those cases it has been given only to the extent of a grain every fourth or every sixth hours. This is not the treatment of rheumatism by Opium ; it is making the patient worse than before—it is inflicting on the patient the mischief arising from the stimulant effect of the drug, and withholding from him all the benefit of its sedative influence. The Opium, if administered, should always be increased in dose, both in frequency and quantity, until the patient feels decided relief ; and should then be kept up at that dose until the disease is steadily declining. The first indication that tells the practitioner he has reached the proper dose is the statement of the patient, who, in reply to an inquiry as to how he has passed the night, probably says that he has not slept, but that he is free from pain and feels comfortable. This effect having been attained, the Opium may then be continued in repetitions of the same dose as to frequency and quantity. In one of the cases that I have reported the rapid good effects of the large doses were shown. A relapse set in ; the patient got two grains of Opium every third hour, uninterruptedly, for twenty-four hours. He took sixteen grains of Opium within twenty-four hours and the relapse was suddenly cut short. In another case, in the first day eight grains of Opium were administered ; the dose was then increased to twelve grains within the twenty-four hours for the

second, third, and fourth days ; and on the fifth day he was taking bark. *N.B.*—I think about ten or twelve grains in every twenty-four hours will be found the average quantity required. The tolerance of the remedy is a remarkable feature in the treatment, and may, I think, be fairly adduced as an argument in favour of its propriety. The head is not affected by the large quantity of Opium administered. This is remarkably shown in a case of Dr. Aldridge, where the head was not injured by the Opium, even though there had been previously a tendency to derangement of cerebral functions in all previous febrile affections. There is another singular circumstance connected with the exhibition of the Opium. It is the occurrence of diarrhœa while the patient is using the Opium even in full doses in some instances, the diarrhœa becoming so troublesome as to require starch enemata, or chalk mixture, with Kino. It is seldom necessary to purge the patient while administering the Opium ; indeed, the pains are sometimes brought back by the administration of a purgative, either from the patient taking cold in rising from his bed, or from the irritability produced by the action of the purgative. The patient's bowels, if they have not been constipated in the commencement of the attack, may be not only safely, but with benefit, not disturbed more than once in two days. In most cases warm embrocations should be applied to the affected joints, such as warm spirit of turpentine, or camphorated spirit, or simple decoction of poppy-heads ; or when only slight stiffness with little or no swelling remains, a liniment of equal parts of Ol. Terebinth. and Ol. Camphoræ with one drachm of sulphur to each ounce of the liniment.

There arises in the progress of a case of acute rheumatism a state that is sometimes perplexing. The fever is very much abated, the skin is covered with almost constant perspiration, sometimes even to the degree of producing a miliary eruption, and so very profuse in quantity that the patient, when the clothes are raised, steams like one in a vapour bath, and the skin becomes clammy,

pale, and soddened ; the pains become erratic, and the pulse becomes quicker and smaller ; in such a stage and with these symptoms, the conjunction of Sulphate of Quinine with Opium is the combination that I think will be found most beneficial. The case that I have before described and commented on shows the very good result of the exhibition of the combination of Quinine and Opium in that particular stage. Another remedy of considerable efficiency when the acute stage is passing away, is the Mistr. Guaiaci. The preparations of Guaicum have been an old and favourite popular remedy in rheumatism, and have fallen, perhaps undeservedly, into comparative disrepute. As it is not my wish to travel beyond the acute form of the disease, I shall therefore make no observation on the use of the Hydriodate of Potash, or of any of the remedies adapted to rheumatism when passing into a chronic state. There is one form of acute rheumatism in which the opiate treatment will cause disappointment, should the practitioner trust to it alone. It is that form which we sometimes meet with in persons whose habit of living, and perhaps hereditary tendency, give a predisposition to Gout, and in whom when rheumatism does appear, it is not genuine rheumatism, but a combination of Gout with Rheumatism.

CHAPTER X.

THE CHARACTERISTIC PECULIARITIES, PATHOLOGY, AND TREATMENT
OF RHEUMATISM, MORE PARTICULARLY AS IT IS FOUND PRE-
VAILING WITHIN THE TROPICS.

In consideration that the practice pursued in rheumatism is so far undefined and somewhat empirical; one employing lemon juice, another Colchicum, a third a purely alkaline treatment, without any explanation of the principles or differences of diseased condition on which such opposite systems of treatment are recommended, has studied the disease, as met with in Europe, and compared it with that prevailing within the tropics, among a class of patients subsisting almost exclusively on non-azotized articles of diet. The great prevalence of rheumatism, and the severity of some of its forms, both among Europeans and Natives in Africa and in India—originating under atmospheric conditions and habits of life so different from those under which it is found prevailing in this country—seem well calculated to afford light into the nature of an obscure disease which may be said to be protein in its modifications. I shall endeavour, therefore, to have my observations confined to three points. 1st. Leading varieties of tropical rheumatism, and the particulars in which rheumatic inflammation differs from simple suppurative inflammation. 2nd. Origin of the rheumatic diathesis, nature of the paroxysmal fever accompanying articular inflammation, and causes which produce them. 3rd. The general principles of treatment.

Tropical Rheumatism presents two principal forms, viz., the steno-plogistic, or acute; and the astheno-cachexial, or chronic. The former, in its attack of particular tissues, shows a preference for

the compound membranes of a serous and mucous kind ; the latter affects the muscular, nervous, and filamentous tissues, including the aponeurotic expansion of muscles and peritoneum, having much of a neuralgic character, and being accompanied by vitiated nutrition and wasting of the parts affected. The very acute variety, associated as in Europe with pericarditis, or endocarditis, is a form of the complaint seldom presented to observation in Africa and India, though cases in which the ordinary symptoms of heat, pain, redness, and swelling of the joints, accompanied by fever, are present, occur both among Natives and Europeans. Such attacks usually happen among those inhabiting the colder, dryer, and more elevated table-lands of that country. The astheno-cachectic varieties, associated with different forms of periostitis, having all the character of mercurial syphilitic cachexia, are peculiarly the produce of malarious districts. Several interesting cases of these different forms are given in illustration and proof that astheno-cachectic rheumatism, associated with arthritic periostitis, is a state of constitutional cachemia—more frequently developed among the Natives of Africa and India than among Europeans—after mercurial treatment.

The proclivity of Native constitutions to this form of disease is said to arise from the more general use of non-azotized articles of diet by the Natives than by Europeans, giving to the former less vital power of resistance to the destructive metamorphoses of the tissues brought on by cold and abused course of mercury. As cachexia advances, in cases of this kind, attended by complication of rheumatic symptoms, the skin becomes harsh and dry, and is covered by white scales or papular eruptions, having all the character of obstinate psora. The intimate existing sympathy between the skin and epithelial covering of the intestinal mucous surface, is deemed to afford sufficient explanation of the occasional association of cutaneous symptoms with derangements of the primary assimilation and intestinal mucous surfaces, as observable in the different forms of arthritic complaints.

The intimate relation that subsists between milder and modified degrees of scorbutic dyscrasia and the forms of astheno-cachexial rheumatism is then pointed out. The connection has, of late years, been almost lost sight of, notwithstanding that the great and accurate observer, Sydenham, described a species of rheumatism resembling scurvy in its capital symptoms, requiring nearly the same method of cure, and which is distinguished by the name of Scorbutic rheumatism. This species of the disease will be found under ordinary circumstances on ship-board, and among European sailors using in excess salt meat diet, with little or no admixture of succulent vegetables, as well as among bodies of men on land living on farinaceous seeds destitute of anti-scorbutic properties, or on a diet of unvaried character, with total abstinence from animal food. Such are the circumstances, aided by extreme aridity or dampness of climate, under which land-scurvy prevails among prisoners in the jails of India and Africa; and also among bodies of Native troops in particular seasons and localities. The same unvaried farinaceous character of diet used by many of our Sipahies predispose them to attacks of cachexial rheumatism. Several cases of this kind of scorbutic rheumatism are given in illustration, wherein lemon juice, with an allowance of potatoes and fresh meat diet, was found to be of such service in aiding the other means of cure.

The graduated form of rheumatism just described derive more of their difference from constitutional causes of distinction, and the less or greater aberration of the blood from its normal state, and through the distinctions of the disease, according to its seat in various parts, are thought to afford less important grounds for opposite therapeutical principles and modes of treatment than the differences deduced from constitutional causes, still the varieties founded on localities are deemed of importance as guides to practical results. The best description of such varieties is considered to be that adopted by M. Chomel: 1st, Articular rheumatism, or rheumatism in the joints; 2nd, Muscular rheumatism,

or rheumatism of the voluntary muscles ; and thirdly, Visceral rheumatism, or rheumatism of certain fibro-serous tissues situated within the splanchnic cavities.

The generality of cases belonging to the first form, as met with within the tropics, oftener presents symptoms of the mild chronic variety than of the intense articular rheumatism of European climates ; and though attacks are generally ushered in by febrile symptoms, these symptoms are of less severity than in colder climates, and the disease is less mobile in character. Muscular rheumatism, too, though observed in every part of the body, and usually more amenable to treatment than cases of the articular form, is more frequently met with in the loins and muscles of the limbs than in any other parts of the sarcous tissues. This is peculiarly a disease of malarious districts, being very prevalent among the men of Native regiments when located in such. The point in question now is, whether the phenomena of rheumatism be identical with those of inflammation and phlegasiæ ? Though rheumatism appears with all the phenomena of the latter, its local inflammation still possesses a specific character more symptomatic than idiopathic in nature, and manifesting in progress that the symptoms proceed from a particular constitutional taint, which gives to them a character distinct from simple inflammation. Rheumatism generally presents quite so much of the neurosis as of the phlegmasiæ ; and though evidence be not wanting to prove that acute articular rheumatism sometimes terminates in suppuration and purulent effusion into the joints affected, still rheumatic inflammation differs from simple inflammation, inasmuch as it proceeds from a specific cause, and is associated with greater abnormal sensibility of the nerves.

Regarding the origin of the rheumatic diathesis, rheumatism is considered as the result of that pre-existing lesion of the assimilating and excretory organs of the body, which, on the application of cold, errors of diet, intoxication, malaria, and like existing causes, gives rise to that abnormal change of the blood

which constitutes the rheumatic diathesis. Sometimes the blood seems altered previous to the appearance of swelling and local rheumatic inflammation, but, occasionally, where the disease is produced by cold acting on constitutions little or not at all disposed to rheumatism, the altered condition of the blood probably follows the development of the local affection. In either case the heightened metamorphic power of the blood globules gives rise to a greater relative formation of fibrine, and progressive diminution of hæmato-globulin, as they occur in rheumatic fever and its consequences. The natural tendency of rheumatism is to anæmia, and to the production of phenomena depending on a diminution of the blood globules, as lately prominently noticed by several medical men—Dr. C. Ferral in especial; in his observations on rheumatic cases with endocardic complications—where, after the employment of depletion and mercury, a cardiac bruit, different from that which originally presented itself, continued to persist, notwithstanding the steady employment of means for subduing inflammatory action.

That morbid condition of the blood, which constitutes the rheumatic dyscrasia, occurs in all cases where the circulating fluid either becomes deteriorated by the absorption of foreign poisonous matter, as in gonorrhœa, and in certain exanthematous diseases accompanied by primary and secondary symptoms, or by the reversion into the blood of increasing morbid secretions, as in uterine affections, that give rise to diseased conditions, which, though now fashionably treated as local disease by caustic and other like applications, are often, indeed, results of this very state of constitutional dyscrasia.

The anatomical seat of rheumatism is peculiarly confined to the fibro-serous tissues, including articular capsules, cellular tissues, mucous follicles, synovial glands, the interior ligaments of the joints, the muscles, and tendons, the dura mater as reflected on the medulla oblongata and spinal cord, the pleura, the peritoneum, and nerve tubules. The localized manifestations of

disease are accompanied, according to age, temperament, and previous habits, by almost opposite conditions of the blood, states of hyperinosis and hypenosis, which differences of constitutional cause give the rheumatic swelling of the joints, more or less, the character of ordinary inflammation. The local swelling of sthenophlogistic rheumatism differs from ordinary inflammation in having more a character of irritation than the latter; but, according to the researches of M. Andral, agrees with it in this, that the fibrine in the blood increases from two-and-a-half or three to as much as ten parts in one thousand, oscillates in the sub-acute form between four and five, and returns to the natural standard in well-marked chronic cases. This state of hyperinosis is, however, rather relative than absolute, being accompanied by a corresponding diminution of the red corpuscles which, as Simon supposed, are wasted in the metamorphic production of the fibrine.

We come next to the treatment, and the general therapeutic principles to be followed in attacks of Tropical and European rheumatism are: 1. To subdue constitutional irritation and fever by narcotics and refrigerants. 2. To eliminate from the system the retained cholæic elements and other excrementitious matters of the blood, which render the urine acid and occasion its lithic deposits. 3. To restore the conditions of normal nutrition by suitable diet in the steno-phlogistic kinds, and by iron, cod-liver oil, and tonics, when the rheumatic symptoms are associated with cachexia. 4. To subdue local symptoms of swelling and pain by leeching, cupping, and blisters, followed by anodyne applications or local anæsthetics.

In order to fulfil the first indication, which is the principal and leading one in cases of the sthenophlogistic kind, much professional discussion has arisen regarding the efficacy and propriety of general bleeding as one of the means. The extent to which this remedy may be usually employed will depend much on the youth and naturally plethoric constitution of the patient, the inflammatory character of the local affection, the severity and tonic nature

of accompanying fever, and the purity and bracing influence of the air to which the patient has been habitually exposed. The degrees of fever are found to correspond, generally, to the coldness and purity of the air in which the patient has lived, the azotized richness of the diet, and the proportionate hyperinosis of the blood, accompanying good air and rich nourishment. In a general inflammatory diathesis, therefore, the propriety and efficacy of general bleeding are fully established by our own experience, and recommended by a host of unexceptional authorities. But the natural tendency of rheumatic inflammation and fever being to produce anæmia, we must not be too prodigal in wasting the nutritive resources of the constitution, and should be guided in repeating the bleeding, according to the quantity and inflammatory firmness of the blood clot, and the effect which the first bleeding may have had in subduing irritation and mitigating fever. The same extent of general blood-letting, that might be useful to the temperate and well-fed inhabitants of cold salubrious localities, would be highly injurious to the nervous, irritable, bodily habits of those addicted to excessive beer drinking and other dissipated practices. The same quantity of blood, then, abstracted to cure quickly the plethoric mountaineer of Scotland, would endanger the life or render tedious the convalescence of an inhabitant of London, breathing an atmosphere deteriorated by sulphuretted hydrogen. The necessity, too, of general bleeding in tropical rheumatism is rather an exception than the rule, as might be expected from the comparatively mild character of its fever and inflammatory symptoms. To carry further this indication, after a moderate bleeding, recourse may be had to ten grains doses of Nitrate of potash, three or four times a day, in the form of effervescing draughts ; or the Nitrate of potash may be combined with Nitrous ether and other diuretics, the intention in either cases being to subside or subdue heat and inflammation, by restoring the normal excretory functions of the skin and kidneys. The utility of Nitrate of potash seems dependent on its power of

diminishing the plasticity of the blood, and suspending the metamorphic disposition of the blood globules to produce fibrine. Under its use the specific gravity of the urine is increased, this being a medicine which possesses the power of eliminating urea and other compounds of lithic acid from the system. Such power is probably increased by the combinations of Nitrate of potash with other alkaline compounds, as the citrate and acetate of potash, which are converted into carbonates in the course of the circulation. All such means, however, prove refrigerant by subduing the heat and irritability of the body, and the effect of such may be greatly increased by the addition, at bed time, of anodynes, ether, opium, or aconite.

Of medicines best adapted to carry out the second indication, calomel and Dover's powder at bed time, followed, next morning, by a solution of sulphate of magnesia in compound senna infusion, with the addition of an alkali and colchicum, will be found among the most useful. Much misapprehension regarding the beneficial therapeutic action of the latter drug seems to exist; some deem its chief efficacy consists in its power of eliminating urea and uric acid from the system, while others deny to it any efficacy in subduing symptoms of true rheumatism. It is chiefly useful in cases of the acute disease, accompanied by a foul loaded tongue, biliary derangement, and intestinal mucous accumulation. Both our Indian, African, and European experience has convinced me of the fact, that without its purgative effect being induced, the urinary secretion is seldom so much increased in quantity as to bring with it any considerable relief of rheumatic symptoms. The most beneficial mode of administering it in Africa and India, is to give the wine of colchicum twice or thrice a day, in a weak solution of tartarized antimony, along with liquor potassæ and tincture of the hydrochlorate of morphia. Free action of the kidneys and skin is thus kept up, and the feverish frequency of the pulse reduced; but, even in such a case, the use of purgatives, and the elimination of the biliary secretion, must not be neglected

or lost sight of. Where diarrhœa, or the purgative effect of colchicum is established, then the amount of urea or uric acid in the urine appears to be diminished, these compounds being eliminated, as would appear, by the intestinal evacuations. Dr. Bodcker, in a late minute examination of the action of various medicaments, with reference produced by them by the constituents of the urine, the exhalations of the lungs and the blood, found that, contrary to the general opinion of pharmacologists, the use of colchicum produced but slight diuretic action, and had very little effect on the constituent parts of the urine. During its employment the activity of the skin and lungs in exhaling carbonic acid is considerably augmented, and after a time its effect in causing an augmented secretion of bile becomes apparent; the melantotic blood globules, which are unable to combine with the oxygen in the air, being destroyed in the hepatic system, afford materials for an augmented secretion of bile. The result of his analyses, thirteen in number, on the action of colchicum, and its known utility in rheumatism, seems to bear strongly on the truth of the opinions expressed as to the pathological nature of this disease.

The employment of calomel, with a view of obtaining its full purgative effect in cases of the stheno-phlogistic variety, should be more steadily pursued to carry out this indication, that the plan of giving it with opium in order to obtain its constitutional effect. From its special action on the biliary organs, it is, both in African and Indian rheumatism, an invaluable remedy; and in England when properly administered in aid of colchicum and other purgatives, will be found of much utility, by depurating the blood through increased biliary secretions, in those hyper-carbonized states of the system associated with the disease in many of those cases met with in London. The practice of mercurial fumigation, as successfully used both in this country (Europe), Africa, and India, proves useful by increasing the elimination from the skin, and restoring the cutaneous functions to a normal state.

The same result may be partially secured in both varieties of the disease by means of warm bathing, warm clothing, and friction of the surface. The third indication has more immediate relation to cases of the astheno-cæchexial kind than to those of acute rheumatism. The impaired state of the digestive function being so intimately associated with the origin and progress of the rheumatic constitution, it is of much importance, while carrying out the second indication, in acute varieties of the disease, that due attention should be given to the diet of the patient, which must be diluent and of easy assimilation. In the early stage of disease it should consist of gruel, thin arrowroot with milk, or weak broth; and if beef-tea be allowed, it may be given with the addition of twenty or thirty drops of liquor potassæ; the alkali serving to neutralise the lactic and other acids which accumulate in the stomach along with diseased mucous secretions. As phlogistic symptoms, even in the worst examples of acute Indian and African rheumatism, are associated with much destructive irritation and waste of tissue, a too active or injudicious employment of the diaphoretic and purgative treatment must be avoided, as such will both derange the primary and secondary assimilation. Such derangement is marked by emaciation, loss of strength, pale anasarctous visage, and other signs of cachexia, and as the early appearance and rapidity of such symptoms are most remarkable in persons inclining to the leuco-phlegmatic temperament, the treatment for carrying out the two previous indications should not be such as makes too great a demand on the resources of the constitution. When cachexia appears, we must have recourse to the bark, sulphate of quinine, preparations of iron, or iodide of potassium, all of which operate beneficially on the constitution, by improving the tone of the organs of primary assimilation, modifying the nutrition of the tissues, and increasing the hæmatine of the blood. A combination of these several remedies may be necessary, according to the nature of particular cases; and where iodide of potassium, if given alone, would utterly fail in

relieving symptoms, it may be usefully employed in combination with the bark, or saza-decoction, or extract of taraxacum, by which the double effect of healthy cutaneous action and increased elimination by the kidneys may be generally secured. The iodide of potassium must not be given in large quantities, but along with it laxatives are as essential as in using colchicum. In many such cases, the compound decoction of sarza, to the extent, at least, of half-a-pint daily, *i.e.*, taken twice daily), with an equal proportion of warm milk, has been found to be of much utility in promoting the nutrition of the tissues and bringing back healthy cutaneous action. The extract of sarza pills, with resin of guaiacum and sulphuret of antimony, may be given advantageously with the same object, care being taken to supply the patient with light easily digested elements of nutrition. Among such elements we may mention cod-liver oil, which in two cases, when prescribed in this country, proved of much benefit. One of these was a case of excruciating pericranitis, affecting the aponeuroses of the cervical vertebræ, and accompanied with neuralgia of the inferior maxillary branch of the fifth pair of nerves; the other was hysterical neuralgia of the intercostal muscles. In both cases counter-irritation was employed by means of a liniment of oil of turpentine, with pyroligenous acid over the parts of the patient; and in the former the oil was given along with the extract of aconite at bed-time.

The last and fourth indication is to employ remedies suited to subdue the pain and swelling of the local affections. If such are of a muscular kind, strong stimulating terebinthinate liniments, warm fomentations, and shampooing of the parts, will be found beneficial in relieving pain; but in some cases, such was its severity and persistence, that the patients were relieved by nothing except the abstraction of blood from the parts by means of cupping-glasses. When the joints suffer, and are much pained and swollen, we found no local applications more favourable and useful than leeches and repeated blisters to the parts. If the

latter be employed, the blistered surface may be dressed with an ointment containing small quantities of the hydrochlorate of morphia, or extract of belladonna. The application also of a wet bandage, saturated with a lotion of camphor mixture, wine of colchicum, and tincture of the hydrochlorate of morphia, covered over by cotton wool and a piece of spongio-piline to prevent evaporation, will be found of much utility. Others have of late recommended for the same purpose a chloroform lotion, or one of Dutch liquid, stating such to be of great utility in relieving the pain and swelling of the joints; but though we have had no experience of their efficacy, they appear well calculated to fulfil the same intentions as other like remedies which have been long in use. More might be said as to the greater or less efficacy in rheumatism of special remedies, but as we place little faith in such when used without discrimination, we defer any such remarks to a more fitting opportunity, the great object of this chapter being to delineate the leading characters of rheumatic disease, and the therapeutic indications most applicable to each.

CHAPTER XI.

ON NITRATE OF POTASH IN ACUTE RHEUMATISM.

WITH regard to the form of disease in which this salt is most likely to prove beneficial, the testimony derived from the cases I am about to cite decidedly shows that its efficacy is most remarkable in acute rheumatism ; and it might almost be said that the beneficial result was the more striking in proportion to the activity of the attack. When subacute rheumatism supervened upon the chronic, although the nitrate was commonly efficient in removing the former, it seemed to exercise no influence over the latter. So invariably was this observed, that I have ceased to prescribe this medicine in purely chronic cases. Pains of a gouty tendency and the capsular variety of rheumatism appear to be equally irremediable by this means. No preliminary treatment was adopted, but the salt was almost invariably commenced at whatever period of the complaint the patient happened to be on his admission. There is no reason to suppose that its influence is greater at one stage than at another. It should be stated, however, that an aperient was prescribed when it was required, and sometimes an anodyne at night when the sufferings were so great as to prevent sleep.

From the summary of these cases, therefore, it appears that the average duration of the acute symptoms after the commencement of the treatment was about eight days. In three cases the rheumatism disappeared before the seventh day. In one it was protracted to the eighteenth. But most of the patients had the

complaint some days before their admission to the hospital, and sometimes it was not possible to obtain precise information as to the date of the seizure ; but so far as this could be determined, the whole average period of the acute cases appeared to be about sixteen days.

Taking the results from the most unfavourable aspects, it must still be admitted that they support the opinion of the efficacy of the nitrate of potash in rheumatism. In some of the cases the relief followed its exhibition almost immediately, and the improvement was rarely delayed for any considerable period. Besides the very obvious advantage of removing a complaint so painful as rheumatism as speedily as possible, it is otherwise important to lessen its duration ; and especially because it diminishes the chances of those frightful complications which may attend the disease at every stage of its course. In no instance was there even threatening of valvular disease. The condition of the heart was carefully watched at each visit, and in all the patients it preserved its natural sounds and rhythm. This scrutiny was always repeated before each patient left the hospital, and with similar negative results. It is true that in two instances the endocardial murmur existed, but in both these patients the complication did not commence in the hospital. One had an acute attack of rheumatism, in which the nitrate was prescribed with complete success, no vestige of heart affection being present on her dismissal. But a fortnight afterwards she was brought back to the hospital again, having had a relapse of the complaint, and now a loud systolic murmur was immediately detected. In another, the heart was hopelessly injured previous to his admission. These cases cannot be therefore set down as evidence against the utility of the nitrate of potash in rheumatism. At the same time the number of examples is far too few to establish the probability of immunity from heart complication under this treatment. It can only be said that, nothing of the kind occurred in these patients.

It is not easy to determine the mode of action of the salt in this affection. The theory that it removes from the system a supposed redundance of the lithates and lithic acid can hardly be sustained. Not only was there no marked acidity of the urine in several of the patients, but in two of them it was strongly alkaline, and in one loaded with phosphates. Even during the continuance of the nitrate the urine regained its property of slightly reddening litmus-paper. Nor was there any sustained sensible action either on the bowels, skin, or kidneys. Purging never once occurred. In a few cases the perspiration was occasionally increased, but by no means continuously; and bearing in mind the tendency to copious sweating in rheumatism, it might be questioned whether the salt does not exert an influence in moderating rather than augmenting the cutaneous discharges. The urinary secretions was increased more frequently, and rather more permanently, but the diuresis was never very remarkable. Whether the salt possesses any action on the fibrine of the blood these observations do not enable me to determine, but the symptoms and aspect of some of the patients scarcely warranted the idea that there was an excess of that ingredient in that circulating mass. The dose of the nitrate never exceeded half an ounce, and it was sometimes limited to three drachms daily; it was dissolved in a pint of water, the patient being directed to take the whole in twenty-four hours. This is a much smaller quantity of the salt than it has been recommended to employ for the cure of rheumatism; but there is a manifest advantage in prescribing it in as small a dose as will answer the purpose, for there will be less danger of its producing gastric or renal irritation; and when two or three ounces are given daily a large quantity of fluid is required for the necessary dilution, and this circumstance alone would render the remedy too disgusting to admit of its general adoption. No injurious consequences arise in any instance from the exhibition of the medicine, nor was there any complaint made by the patients of the disagreeableness of the remedy, or of any

inconvenience arising from its use. There may be an apparent exception to this fact in one patient, who complained of dysuria when undergoing treatment with the nitrate. But as this symptom continued, although the medicine was withdrawn, and subsided after it had been again prescribed, it is hardly probable that the irritation had been occasioned by it in the first instance.

CHAPTER XII.

INFLUENCE OF LIQUOR POTASSÆ ON THE URINE IN
RHEUMATIC FEVER.

THE following summary expresses in general terms the action of Liquor Potassæ on the urine of twenty-four hours :—

Urinary Constituents.	Condition in Rheumatic Fever.	Effect produced by Liquor Potassæ in large doses.
Water.	Greatly diminished.	Slightly increased over rheumatic average.
Solids.	Increased.	Still more increased.
Urea.	Probably increased.	Probably increased.
Uric Acid.	Increased.	If affected at all, slightly increased.
Creatine.	Undetermined.	
Sulph. containing Comp.	In considerable quantity.	Probably increased.
Chlorine.	Diminished.	Unaffected.
Sulphuric Acid.	Greatly Increased.	Still more increased.
Phosphoric Acid.	In some quantity.	Uncertain.
Bases.	Undetermined.	Uncertain.
Insoluble Salts.	Undetermined.	Uncertain.

The urine in rheumatic fever appears to have peculiarities which distinguished it from the urine of other fevers. It resembles the typical febrile urine in its deficiency of water, in its depth of colour, in its great percentage of solids, and in its rapid deposit of dark urates. But apart from possible differences connected with the urea, and extractives, it differs from the febrile urine of pneumonia and the specific fevers in the greater amount of the absolute excretion of solids (i.e., in twenty-four hours), and in the enormous excess of sulphur, and its derivatives. The

excretion of sulphuric acid is far greater than in any other febrile disease which I have explained and examined—viz., than in small-pox, typhus and typhoid fever, scarlatina, erysipelas, pyæmia (with purulent arthritis), pleurisy, and pneumonia. In these cases the sulphuric acid has been also in excess of that which would have been found during healthy tissue metamorphosis, except in some cases of pneumonia in which the sulphuric acid (in common with other urinary ingredients), has been retained in the system during hepatization, and been poured out afterwards during resolution.

The excess of sulphuric acid in the rheumatic urine is not due to any excess of febrile action in this disease over the other fevers just enumerated. In cases of typhoid fever and scarlatina, the temperature has been higher than in rheumatic fever; and yet the amount of sulphuric acid passed in twenty-four hours has not reached to half the quantity. The sulphuric acid is not, then, in any close proportion to the temperature. As the temperature is usually considered to be a correct indication of the rapidity of tissue-metamorphosis in febrile disease, it follows that rheumatic fever is an exception to the rule, and that the sulphuric acid is in excess of what would have been predicated from the amount of fevers.

It appears, therefore, a fair inference that in rheumatic fever there is a source of sulphuric acid, independent of the augmented disintegration of tissues, as measured by the heightened temperature; and it may, perhaps, be conjectured that chemical analysis will hereafter demonstrate the existence in the blood of some compound richer in sulphur than fibrine and albumen; which, during the height of the disease, is rapidly disintegrating, and forming, probably among other products, sulphuric acid.

The effect of *Liquor Potassæ*, of the bicarbonate, and perhaps of the alkalies, is at once to aid this disintegration, and to increase the elimination of sulphuric acid by augmenting the alkalinity of the blood. If this hypothesis be correct, the administration of

alkalies in rheumatic fever would acquire a basis more rational than that usually assigned—viz., that they merely neutralise acid already formed.

With respect to the efficacy of *Liquor Potassæ* in rheumatic fever, although the cases are so few in number, yet as it is unlikely that additional cases can be treated so rigidly without other medicines, and as, in fact, other remedies (mercurial purgatives, colchicum, opium, hot air bath, etc.), ought to be employed, I may mention the general conclusions which may be deduced from these four cases.

No symptom was immediately affected, except the pulse; this was generally, but not always, lowered, and sank, although the temperature continued high, to 80° , 70° , and even lower. The febrile heat (as measured in the mouth), the articular pains, and the perspirations, were not affected, except in so far that the duration of the disease was shortened. The effect on cardiac complication was uncertain; in one case pericarditis came on, but there was a strong suspicion that it had actually begun before the medicine was commenced; in two cases basic systolic murmurs appeared, in one case before, in the other (a man) decidedly after the potash was commenced. The murmur, however, disappeared during convalescence.

The duration of the disease was in three cases short, although the severity of the early symptoms led to the belief that it would be obstinate and long-continued. The first case lasted scarcely a week: the second eighteen days: and the third (a relapse) about seven days. In the fourth case (old and recent heart-complications, pericarditis) the duration was greater, and the patient was not convalescent till the twenty-third day. The average of the whole was 13.75 days from the first symptoms; but as an average of 3.25 days occurred before treatment, the actual period from commencement of treatment to perfect freedom from joint-pain and fever was ten and a-half days. This result (if it occurred in all cases) would certainly be favourable, but it is well known that

other observers have obtained equally fortunate results from very different treatment ; so that the superiority of the treatment by Liquor Potassæ, *per se*, cannot be held to be sufficiently proved.

N.B.—I must here remark that the great disadvantage in Liquor Potassæ is its nauseous taste, and frequently also, after a time, if it be given in large doses (and this is necessary), the stomach does not tolerate it well.

CHAPTER XIII.

THE PATHOLOGICAL AND THERAPEUTIC ANALOGIES OF THE
SALICYL COMPOUNDS, THEIR NATURE AND TREATMENT.

PHYSIOLOGY teaches us, that while the red corpuscles as carriers of oxygen in all likelihood stimulate the appetite of the tissue-elements for the pabulum contained in the blood, and thus promote assimilation, they also promote the consumption of the tissues—the decomposition of albumen, the oxidation of fatty matter, etc. Hence, while oligocythæmia may, on the one hand, interfere with nutrition and delay its progress, on the other it must tend to preserve the tissues, retarding to some extent their disappearance. Here we may adopt the pathology of Shakespeare :

The life of all his blood
Is touched corruptibly : and his pure brain
(Which some suppose the soul's frail dwelling-house)
Doth by the idle comments that it makes
Foretell the ending of mortality.

A general survey of all that we now know concerning the molecular metamorphosis, the nutritive and formative activities of rheumatic persons, brings us to the conclusion that, a few peculiarities apart, the organic movement (or flux of vital processes), whether as regards the mass moved, or the rate of its motion, is lessened in proportion to the degree of impoverishment of the blood. But the considerations which I have in former chapters enumerated show that the activity of molecular metamorphosis in acute rheumatic patients is reduced because of the diminution in

the store of potential chemical energy, to which the organic movement may be said to owe its very existence.

In many instances the amendment is so gradual, that we can hardly say when it begins. In other cases, the favourable crisis is preceded by an aggravation of most of the former symptoms, and a marked increase of the general distress. This is a very curious circumstance, and it did not escape the notice of our great dramatist :—

Before the curing of a strong disease,
Even in the instant of repair and health,
The fit is strongest. Evils that take leave,
In their departure most of all shew evil.

These views are further corroborated by what we know of the temperature of the body, and the morbid effect of the salicyl compounds in rheumatic patients. Since the greatest part of the energy developed in the organism is expended on the production of heat, we may assume that any decrease in the functionally important ("charged with potential energy") constituents of the blood will be followed by a diminution in the average amount of heat produced, the latter betraying itself by a tendency to low degrees of temperature. In point of fact, we do find the temperature of rheumatic patients varies—at one time rather high, and at another low ; often quite sub-normal, and there is reason to ascribe this to lessened heat-production, since it cannot always be accounted for by increased dissipation of heat. The administration of the salicyl compounds in cases of acute rheumatism can be only attributed to the latter cause, when a transient afflux of blood to the skin, or a profuse perspiration, immediately precedes an unusual fall of temperature. But we very often find likewise, that the temperature of rheumatic patients taking salicin is at times low, and sometimes high, and associated with a pale, dry skin ; in such cases we cannot but think of lessened heat-production. The latter, too, will serve to explain the liability of rheumatic persons to subjective sensations of cold; when the

temperature of the air is by no means very low ; though feebleness of the heart's action must contribute its share, by allowing the blood to stagnate in internal parts, instead of pumping it to the surface. The skin thus contains too little arterial blood ; it is insufficiently heated, and those nerve-ends by which we appreciate variations of temperature are stimulated just as they might be by actual coldness of the surrounding medium ; hence the sensation of cold, exactly similar to that produced by the cutaneous rheumatism resulting from spasm of arterioles.

In striking contrast to the sub-normal temperature of many rheumatic subjects, stands the abnormal high temperature of febrile patients. This is chiefly due to increased activity of molecular metamorphosis. The longer the fever lasts, however, the more marked does the antagonistic influence of febrile rheumatic fever become, and the more characteristic are the modifications that it introduces into the temperature curve, due to the pyrexia itself. For as the patient grows more and more anæmic, the continued type of his daily temperature is modified by remissions, and finally by intermissions. Inter-current collapse of the temperature, during which it may sink very low indeed (33° to $35^{\circ}\text{C.} = 91.4^{\circ}$ to 95°F.) Sometimes occurs, either quite spontaneously, or as an unexpected result of trifling antipyretic measures (moderate withdrawal of heat, small doses of Quinine, with one of the salicyl compounds, Digitalis, etc). It points to a reduction in the energy of the heat-producing processes, which prevails more and more over the pyrogenic cause. Nay, in well-marked forms of rheumatic (the fever of patients who are already anæmic), such as seen in the last stages of phthisis, the pyrogenic matters resulting from the breaking down of lung tissue are at last no longer able to excite any appreciable rise of temperature or febrile movements. We then see the curve, after having exhibited during a variable period of time the familiar type of a quotidian intermittent, present that ominous fall of the evening temperature to a sub-febrile or even normal level, which, so far from being a good sign,

and more especially in the various complications of rheumatism, is usually the forerunner of death. We shall not often go wrong, if with these various complications we predict death in from 48 to 72 hours, when, without adequate apparent cause, the high level of the evening temperature, (39° — 40° C = 102.2° — 104° F.) sinks to 38° C (100.4° F.) or lower, while the morning temperature at the same time falls to 36° C (96.8° F.) or less.

Comment.—The adopted theory of Dr. Garrod, viz., that Quinine with one of the Salicyl compounds should be administered conjointly in cases of acute rheumatism, is quite logical, and I hold with him entirely, for the reason that there is seldom a relapsing tendency, and the fever in its departure leaves the patient in a much more satisfactory condition; and it is much more efficacious with this combination, than when prescribed alone.

Salicine, salicylic acid, and the salicylate of soda, have all been recently and largely used in the treatment of acute-rheumatism, given in doses of grs. 10 to 30, and even more at intervals of from one to three hours, and the larger doses of grs. 30 or more every hour, as the case may be. Under all these remedies, the average duration of the fever has been remarkably shortened, to 4.9 days under salicine, and 4.1 days under the acid, an advantage of from one to three days over the results of the alkaline treatment, and in comparison with the Tincture of Iron treatment, in which the temperature becomes normal in half the cases in ten days; under salicylic acid, it becomes normal in half the cases in three days. Methinks, there is no definite evidence as yet to prove that either of these drugs are specific remedies, for they do not cut short the disease, nor prevent relapses, when under their influence; nor do they seem to ward off complications; they seem rather to act, as I have previously mentioned, by reducing temperature as they do in their febrile conditions, and they lessen the chance of complications in the same proportion as they shorten the disease.

The researches of Stricker, Fürbringer, Fischer, Reiss and others, established the fact, that these remedies possess a very remarkable power of lowering the abnormally high temperatures in febrile

diseases. In the experience of Dr. Stricker of the drugs in acute rheumatism, salicylic acid may be administered in hourly doses of from grains *vij* to *xv.*, without injury to the human system, and for a longer time to young and vigorous subjects, than to the old and feeble, as toxic symptoms appear sooner in the latter than in the former. These toxic symptoms are of various degrees, viz : Noises in the ears, difficulty of hearing, and perspiration ; which, when they appear, contraindicate the further use of the remedy : Apropos of the salicylate of soda, it should be given in fifteen grain doses every two hours, until sixty grains are taken, and then continue with fifteen grain doses every four hours, to keep up the effect of the drug, and if pericarditis is present, five drops of Liqr. Opii Sedativ. with each dose. The perchloride of Iron, as recommended by Dr. Reynolds, seems unfavourable. In the acute continued cases it has been associated too frequently with hyperpyrexia, to regard it as altogether free from damage ; and in the relapsing forms, its administration neither shortened the cases nor prevented relapses. These relapsing cases of rheumatism may be kept on salicylate of soda very well for the first seven days, but the opportunity of the spontaneous remission which then generally takes place, and is indicated by the thermometer and the patient's own sensations, should be seized to shake the periodicity of the complaint. Drs. Maclagan, Ringer, and others, insist on the necessity of giving large doses frequently, and my experience completely confirms the recommendation. Little or no good whatsoever follows small doses ; thirty or forty grains every two hours are required to make an impression on rheumatic fever.— N.B. When the administration of such a dose fails, thirty grains hourly should then be given, which evidently will produce the salicin symptoms, viz. peculiar breathing, some deafness and dulness, vertigo, headache, tinnitus aurum, nausea, and vomiting after every dose ; profuse sweating, great weakness, and occasionally a peculiar eruption on the skin. The symptoms more rarely assume a dangerous aspect, *e.g.*, Albuminura, great prostration,

violent delirium, feeble pulse, and pallid skin, ushering in collapse. Such accidents have been ascribed to contamination of the remedy with phenol, owing to some mishaps occurring during its manufacture. After the administration of perfectly pure samples of the drug, undoubtedly they have been observed.

The salicyl compounds form a numerous and remarkable series; there are in all some thirty or forty substances included in it, the chief of these are as follows, viz.—

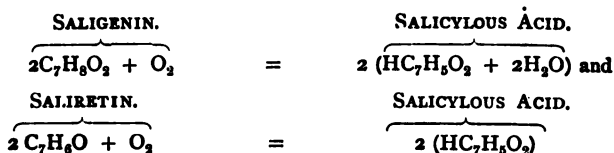
Salicin	...	...	...	...	...	$C_{13}H_{18}O_7$
Salicylous Acid (oleum spirææ)	...	...	...	...	...	$C_7H_6O_2$
Salicylic acid	...	...	...	...	...	$C_7H_6O_2$
Salicyluric Acid	...	...	...	...	...	$HC_9H_8NO_4$
Methyl Salicylate (oil of Winter Green)	...	...	...	...	...	$CH_3C_7H_5O_2$
Helicin	...	...	...	...	...	$4C_{13}H_{18}O_7 \cdot 3H_2O$
Saliretin	...	...	...	...	...	C_7H_6O
Saligenin	...	...	...	...	...	$C_7H_8O_2$

Chemically, with the single exception of the Acid Salicyluric, which seems to contain a certain proportion of Nitrogen, the rest are all composed more or less of Carbon, Hydrogen, and Oxygen.

Par excellence, if any of the series were to be indicated on proofs theoretical, as being the anti-rheumatic agency, we should incline to say, that it is the isolated radical salicyl ($C_7H_5O_2$). Medically, we have hitherto employed for internal administration, Salicin, and Salicylic acid.

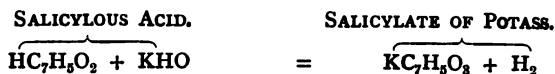
Etiology of Salicin.—Extracted from the bark of the various species of the Willow, a substance having a bitter taste, white and crystalline, somewhat insoluble in water. By the addition of dilute sulphuric acid, or Hydrochloric, and boiled for a few minutes, we observe a conversion into glucose and saligenin, which latter may, after agitation with ether, be found separated in a crystalline form. Furthermore, the same change will be perceived when salicin is permitted to remain in a synaptase solution: The result is, that the salicin is split up into glucose and saligenin, with ferric-chloride; the solution strikes a deep blue colour: *vice versa*, salicin solus gives no such colour.

Should a continual boiling with the acid, be kept up for some duration, it will be observed that there will be a perfect destruction of the saligenin itself, and a resinous substance is then formed, nominated Saliretin. Again, the change does not stop at the formation of saligenin and sugar, when salicin is acted on by a powerful oxidizing agent (*e.g.*) Chromic acid. These substances are also decomposed, the sugar producing Formic acid, and a fragrant oily liquid, which becomes salicylous acid, or oleum spirææ is yielded by the saligenin. When again treated with chromic acid, saligenin and saliretin also yield this oil. The chemical formulæ is as follows :—



Salicylous acid is found native, in the flowers of the Spirææ Ulmaria, (common meadow sweet) and likewise by distilling these flowers with water.

Preparation.— By the decomposing action of dicromate of potass ; it is generally prepared from salicin. It is an oily liquid, colourless, possesses a hot, pungent taste, and maintaining the odour of the flower of the meadow sweet. By the combination with soda and potass, salicylides is formed ; with ferric-chloride, an intense violet colour is obtained. By fusing caustic potash with salicylous acid part of the hydrogen becomes liberated, and salicylic acid is formed thus :



When salicylous acid is boiled in an alkaline liquid with oxide of copper, the same result takes place.

Acid Salicylic is prepared from carbolic acid, by the action of caustic soda: from salicin it may be formed by fusing it for some time with caustic potass. From the oil of Winter-green it may also be formed, by boiling it for a few minutes with caustic potass. Occurs in needle-shaped crystals, sparingly soluble in cold, but in hot water it is very soluble. In combination with alkalis it form salts, which are much more soluble. With the perchloride of Iron, a violet re-action is obtained. Administered internally, it passes away in the urine unchanged, and a portion of it becomes converted into acid salicyluric, described by Miller in his *Elements of Chemistry*, "As a crystallizable colligated combination of Glycocine," by a similar process to that by which, under circumstances analogous, Benzoic acid is converted into Hippuric acid. It may again be split up into Acid Salicylic and Glycocine, by boiling with concentrated hydrochloric acid.

Now-a-days it is asserted, that salicin is converted into salicylic acid in the system. The hypothesis is likewise advanced by Senator of Berlin, whose theory is, that the therapeutic properties are owing to such conversion; it seems untoward however, from what we now know of the chemical relationships of the various salicyl compounds, that the conversion of salicin into salicylic acid, is not the simple process that some would have us to believe it to be, and hence illogical.

For the conversion of salicylic acid, salicin must be subjected to an amount of oxidizing force which is not likely to be brought to bear upon it in the system. As we have previously observed, that by boiling for a few minutes, the production is only saligenin, that by prolonged boiling saliretin is obtained, and furthermore chromic acid, which is a very powerful oxidizing agent, will be required to convey the oxidation beyond this point, and thereby forming a conversion of salicin into acid salicylous. So far so good. This process then is non-sufficient for the production of salicylic acid. Before obtaining this result, we must fuse salicin for some duration with three or four parts of concentrated solution of caustic

potass, to one of salicin ; and by a lesser method, the formation of saligenin, saliretin, and salicylous acid are obtained.

BASING our facts on chemical nosology, we should therefore expect an oxidation of salicin in the system to concur in the formation of these substances—more so than acid salicylic.

Again, if the observations of Millon, Ranke, Latheran, and others, which seem backed up by Senator, of Berlin, demonstrate that this substance is so “converted,” I am inclined to hold with Dr. MaClagan, that I do not think they do, for this reason, that the “test on which these observers relied, and which Senator regards as adequate, are not sufficient” (Maclagan). His theory holds well, for after the ingestion of salicin, they found that the urine at different times denoted a violet re-action with Ferri-perchloride, and the crystals of what they regarded as “acid salicylic” were found in the urine. We, however, now-a-days, know that neither this re-action, nor the crystalline form, is in any way peculiar to salicylic acid. Acid salicylous seems to administer the same re-action, and a deep blue color which is somewhat indential, *i.e.*, saligenin. Their demonstration here did not show that what they obtained (*viz.*, the crystals) were not those of saligenin. More in particular, in one of their experiments, by Ranke, crystals of un-decomposed salicin in the urine were detected.

Dr. Spencer, of Bristol, who some time ago analyzed 1300 CC. of the urine of a man who had taken 120 grains of salicin, observed as follows:—“The crystalline extract consisted of an acid body supposed to be salicylic acid, along with salicyluric acid. The acids could not be separated from one another, nor the amount of each determined, as no good method of separation is known ; but there was no doubt, that some of the crystals contained nitrogen. Now, it may be fairly computed, that the patient had taken 120 grains of salicin in the period during which the 1300 CC. of urine were passed. 120 grains of salicin might yield, if all of it was converted into saligenin and glucose, and thence into acid, 50 grains of salicylic acid. How much salicylic

acid this patient excreted, we cannot tell ; but we know that only about 12 grains of mixed acid crystals were recovered from a quantity of urine representing 50 grains of salicylic acid—and this 12 grains represents glycocine as well as acids. (*Vide* "The Chemical and Therapeutic Relations of Salicin and Salicylic Acids," *Transactions of Medico-Chirurgical Society*, 1878). From the experiments of the German observers, we have no adequate proofs to show that salicylic and salicyluric acids were excreted. Likewise it is not shown that the crystals were not saligenin, and in particular that the nitrogen which some are said to have contained was not derived from uric acid, or urea. Now, granting that the crystalline matter did consist of salicylic and acid salicyluric, what proofs have we that these acids were formed in the body, and not from acid salicylous or saligenin during the requisite process, to the formation of an ethereal extract? Our only certain point is, that from 120 grains of salicin there was not a sufficient production of acid salicylic to facilitate any probable therapeutic effect. From the outward changes which the salicylic compound undergoes in the system—and so far little has been understood of their therapeutic interest,—we should therefore try to avoid any illogical assertions.

I cannot for one moment say, that salicylic acid could not be formed from salicin in the system ; but my assertions will hold good, when I maintain that saliretin, saligenin, and acid salicylous, from their decomposition, are more or less likely to form a result, and serve equally well an explanation of those results which have been regarded as indicative of the existence of acid salicylic.

Furthermore, with ferric chloride, a blue or violet reaction is obtained with all the salicylic compounds, with the only exception of salicin ; with ease, saliretin, saligenin, and salicylous acid are formed from salicin ; but with difficulty with salicylic acid. By the addition of ferric chloride to one taken salicin, the reaction obtained may be due to the existence of saligenin. Some authors who have so far tried to demonstrate that this reaction is due to

the presence of salicylic acid have only succeeded in maintaining the fact that after the ingestion of salicin, that acid is not formed in quantity sufficient in producing any therapeutic effect. Chemical evidence therefore does not maintain the view, that salicin is converted into salicylic acid in the system.

If it be the case, as Senator asserts, that salicin "owes its therapeutic virtues" to its conversion into salicylic acid, we should suggest a therapeutic question, *viz.*, The two drugs: have they the power to exercise the same action on the system? This seems somewhat untoward to clinical experience, for by observations in various degrees we notice that salicin possesses therapeutic properties non-possessed by acid salicylic; and more in especial salicylic acid is a donor of symptoms which do not follow the administration of salicin.

(a) We know from experience that salicin is a bitter tonic, and as such may be prescribed with many great advantages to the health of the patient, with one or two of the alkaline salts, as it stimulates the appetite, and produces a general tonic action, such as frequently follows the administration of quinine.

(b) *Vice versa*, acid salicylic has no tonic action whatsoever; its therapeutic action gives rise to depression, nervous prostration, a sense of weight and oppression in the head, and a feeling of great distressing misery. It may not actually cause delirium.

(c) In the administration of the two drugs in acute-rheumatism, noted observers have commented on their different effects—(*vide Ringer's Therapeutics*)—C. W. Brown, late house-physician of the Boston City Hospital, who have made an extensive and valuable investigation into the action of salicylic acid on rheumatic fever. Drs. MacLagan, Sharkey, Ord, Charteris, and others, maintain the fact that cases treated by salicin are less debilitated at the end of the attack, and convalesce more rapidly than those treated by salicylic acid.

(d) The quantum of acid salicylic requisite to the cure of acute rheumatism, produces often a very great disturbance in the system, more so the brain and the heart.

This drug seems to be a radical and rapid remedy in true acute rheumatism of the joints. It may be said, that it is not quite so injurious to the human organism when administered varyingly from $7\frac{1}{2}$ to 15 grain doses every hour.

In younger and stronger individuals, the pre-mentioned doses can be administered for a longer duration with better results than to the old and feeble, as it produces toxic symptoms more readily than in the former. The symptoms of this toxic vary in degree, those most commonly met with are : noises in the ears, difficulty of breathing, and diaphoresis.

N.B.—The administration of the medicine should be discontinued immediately at the occurrence of such symptoms. For some days after the termination of the main treatment the medicine should be continued in smaller doses for some duration, to prevent relapse. If this drug answers fully the expectation entertained regarding its efficiency, a certain quantity administered internally may be expected to prevent the occurrence of fresh attacks in hitherto unaffected joints; and, also, secondary inflammation of serous membranes, more especially the endocardium. In chronic articular rheumatism its utility seems rather doubtful. In gonorrhœal or diarrhœal rheumatism, or in the polyarthritides attending septicæmia it is likely to prove useless. The favourable experience of Stricker and Reiss is endorsed by German physicians generally. In France it has been successfully tried with comparatively good results. M. Lee informs the profession that by the treatment of this drug for acute rheumatism by him he has cured patients within two and four days.

Dr. Brown, of America (vide *Boston Medical and Surgical Journal*, February 8th, 1877-, found that from the commencement of treatment to the cessation of pain the average duration was 2·85 days. Desau (vide *New York Medical Record*, April

7th, 1877), found likewise that by the administration of this drug to his patients they have been able to return to their work in a week, and he thinks that this new treatment is destined to supersede all others that has hitherto been tried by the profession.

In England the results have equally been successful (vide *Lancet*, July 8th, 1877). We read as follows:—"There are few practitioners who have reported themselves as disappointed in the use of this drug: or, to put it at once strongly and carefully, more disappointed in the use of quinine in ague. There has not been, in fact, such a consensus of medical opinion or any therapeutic question for many years as on the power of this drug, in one form or other, to cure rheumatic fever. It seems that the action of this drug on acute rheumatism ought to be compared to that of quinine in intermittent fever, and of ipecacuanha in dysentery."

Cases, however, have been reported which proved fatal by hyperpyrexia, or by cardiac complication. In the administration of this drug, methinks it is a very great thing to distinguish between the immediate and constant effect of the rheumatic poison and the more or less accidental morbid changes which may take place in the course of the disease to which it gives rise; for without having any direct action on the latter, an anti-rheumatic remedy may exercise a powerful influence in arresting the former.

As it will be impossible for us to think, that ipecacuanha will abolish the hepatic complications of dysentery, and that the cinchona compounds to prevent special enlargement in aguish subjects, so, therefore, it will be unreasonable to expect the salicylic compounds to put a stop to the cerebral and cardiac complications. The fact remains, likewise, that the usefulness of the salicylic compounds will depend upon our having a definite idea of the true nature of rheumatism, and of its characteristic morbid changes. Hitherto we have very unsatisfactory and incompre-

hensive statistical statements of the results of the new treatment of this drug for the undermentioned reasons:—

1. Non-numerosity of statistics.

2. In making those statistics which hitherto we have of little value, and selected statistics that lack what we may term the impartiality, necessary to the truthful demonstration, as the proper mode of applying the treatment has not been sufficiently known and practised.

3. The pathological knowledge of rheumatism is not sufficiently accurate to enable us at present to distinguish between those cases to which the Salicyl treatment is in particular applicable, and to those which it is less suited.

The question now presents itself—In what cases to which the Salicyl treatment is, and to those to which it is not suitable, and the manner in which that treatment should be applied?

We have now, therefore, to deal with the acute, subacute, and chronic forms of rheumatism. It is to the acute and subacute forms (*i.e.*) to rheumatic fever, that the salicylic treatment is most applicable. To obtain its beneficial effects the remedy should be administered in full, frequent and repeated doses. The patient should be confined in bed, bowels relieved if possible, and if necessary diet light and simple, consisting chiefly of milk and farinaceæ.

This treatment should be begun as soon as possible for the interest of the heart's action, as every hour is of great and marked importance.

Twenty to forty grains should be given every hour till there is decided evidence of its action. Before an ounce has been consumed, and oftener before half that quantum has been taken, there is always to be perceived a marked change.

N.B.—The first relief is that of the long-felt pain. Improvement progresses with the continuance of the remedy, and often within twenty-four hours, but more generally within forty-eight hours from the commencement of the treatment, the temperature

is at or near the normal standard, and the pain disappeared. At the decline of the symptoms the dose may be diminished.

N.B.—It is well, however, not to do this quickly, or too early; for if the remedy be omitted too soon, or given in inadequate dose, the symptoms are apt to recur.

The subject in view, therefore, is to help the system persistently under the salicyl influence. So rapidly eliminated are the Salicyl compounds that to obtain their full beneficial effect the drug should be administered in full doses, as well as frequently.

After convalescence seems to be established, the remedy should be continued for some time, as there is no definite period at which we can assure the patient that he is all right, and may leave the medicine without any fear of the returning of the ailment. *Vice versâ*, he should be firmly acquainted that there is a sure tendency to a recurrence of the symptoms, and that the medicine must be taken for some duration after all pain has ceased.

To remove the acute symptoms, about one ounce of salicin or salicylic acid should be required; within the first sixteen or twenty-four hours this quantity should be given to the patient. At the decline of the acute symptoms twenty to forty grains, at first every hour, and then every two or three hours. In the next forty-eight hours a second ounce should be consumed; after that, twenty to thirty grains may be taken every four hours for two or three days; and for a week or ten days more that quantity should be taken thrice daily, by that duration the patient may be considered as being safe. Should there be any threatening return of the rheumatic symptoms, this should be met with by administering larger and repeated doses. If the form in which the remedy be administered be Salicin, and more so as it is a very good bitter tonic, as well as an anti-rheumatic, and those treated by it convalesce more quickly and pick up more rapidly than those who take salicylic acid, the treatment should be gone on with for some time without hesitation. It matters not how speedily the patient is relieved of his pains and the fever abolished, as the affected

fibrous texture cannot at once resume their normal conditions, and not until they have had time sufficiently to do so, the patient should, therefore, remain in bed for a week or more. The physician should call to mind that it is of the greatest importance that a rheumatic attack should be perfectly cured, for the chances are if they are not, there will surely be an increase by subsequent ones if there was an injury done during a first attack.

Thus treated, the course of uncomplicated acute rheumatism will be arrested, and the pain abolished ; and permanent convalescence begins frequently within twenty-four hours, but generally, as I have stated before, in forty-eight hours from the time that treatment commences. When there are no cardiac complications in the first attack, and yea, more in young subjects, such is almost invariably the course of events. The duration of the disease under other method of treatment may be considered to be, in toto, quite different, for under all of them it was common for the acute symptoms to last for three or four weeks ; and twice that time frequently elapsed before the patient is said to be free from pain, or be able to leave his bed. It now seems very difficult oftentimes to keep the patient in bed for more than two or three days.

Some cases I am about mentioning will illustrate the good effects of the salicyl compounds, showing its improved efficacy on the treatment of this valuable remedy.

CASE I.

Jonathan W.—, aged 20, had never rheumatism before ; was quite well on June 14th, 1882. On the 16th felt out of sorts, with some peculiar pains in the limbs, and had a general feeling of cold. The pain increased on the 18th ; got very bad towards the evening. Being anxious of moving about, he did so, as usual ; saying nothing about his pains to any one, which then were very severe in both arms and legs. On being

summoned, patient was in bed screaming with agony, caused by the very severe pains he was enduring.

June 19th, Vesp.—Remains in bed, quite unable to move, and every now and then screaming with pain. The locations of these severe pains were on the back, shoulders, elbows, knees, and ankles, but the knees and ankles, were the most complained of. All of the joints were slightly swollen, and so exquisitely tender, that the least touch or movement caused a screaming. He has no pain in chest. Skin hot, not perspiring; moist tongue, and furried; scanty urine, high-coloured, and loaded with pink urates. Has a soft blowing murmur with first sound, loudest at apex, but audible over whole heart; pulse, 112; respiration, 20; temperature, 103·8°. Treatment: to have fifteen grains of salicin every hour till three powders are taken, and then one or two every two or three hours.

20th, Mane.—Wandered occasionally during the night, but towards the dawn of day had a few snatches of sleep. Pains, especially in ankles and knees, still severe; but not nearly so bad as the day before. The right leg can be moved a little, and when the joints are touched he does not at the least complain, but permits it to be firmly grasped. The tongue furred, skin moist and perspiration acid. High coloured and scanty urine; bowels confined; cardiac blow is softer in character, and precedes as well as accompanies the first sound at the apex. Still heard over whole heart, but not so distinctly as the previous day. Pulse, 96; respiration, 26; temperature, 102·8°. Has had eight powders, equal to 120 grains of Salicin.

N.B.—The patient should continue taking fifteen grains every two hours.

21st Mane.—Free from pain, and had a good night. In the joints there were no pains, and the limbs can be moved with less discomfort than what is caused by a slight feeling of stiffness in the knees. Tongue clearing; natural skin; pulse 72, barely perceptible; respiration, 20; temperature, 98·6°; heart's action

irregular ; murmur still soft, has lost its systolic character, and is now purely pre-systolic, distinct at apex, but scarcely audible an inch from that point. Has had eighteen powders, equal to 270 grains of salicin, He feels much better, and quite well.

22nd.—Likewise that day, feels quite well, slept well, and free from pains, wishes to get up. Natural skin ; tongue clean ; bowels moved ; abundant urine, with a pale amber colour ; pulse 60, feeble and irregular ; respiration, 20 ; temperature, 98·2° ; total administration of salacin, 405 grains. No subjective phenomena was perceived, although the cardiac blood still remained. No return of rheumatism. Salicin, however, was continued for twelve days.

N.B.—We can perceive from this case the rapidity of the cure, the pain having been practically abolished within twenty-four hours ; and the temperature brought to the normal within, at the most, sixty hours of the time that treatment commenced. Me-thinks I should agree with Drs. Maclagan, Ringer, and others that the drug will act more rapidly should the remedy be administered in fuller doses.

CASE II.

Catherine H——, aged 30.—With the exception of scarlatina, she never had suffered from any ailment, and had always enjoyed very good health.

On July 5th, 1882, she felt somewhat out of sorts, and did not leave the house, owing to the aching of her limbs. She was worse on the day following, and got very bad towards night.

July 6th.—Unable to move, remains in bed ; any moving efforts causing intense pains, and making her scream ; expression anxious and painful ; knees and wrists are most painful, but also ankles, right shoulder, and neck. The joints affected are a little swollen, and exquisitely tender to the touch, except over the wrist there is no redness of the surface. Moist and furred tongue ; skin hot, not perspiring ; bowels moved by purgatives ; scanty urine, and loaded with urates ; heart sounds normal ; pulse 112

respiration 22; temperature 103° . Till decidedly relieved, patient to have thirty grains of salicin every hour. The taking of the remedy was commenced at 6 p.m., and patient was then in great pain; but after the administration of the first five powders (at 10 p.m.) she was decidedly relieved, and fell asleep. At 12 p.m. she was roused up, and another powder given to her, and likewise at midnight, and after that, a powder should be given only every second hour.

July 7th.—Expression pleasing and smiling; quite free from pain, except when joints are pressed, permitting one to grasp them, and can be moved without a feeling of stiffness. She perspired a good deal during the night, and would have had a longer duration of sleep if she had not been disturbed when the last dose was administered to her. The skin is now covered with acid perspirations, acid saliva. Tongue cleaner; pulse 88; respiration 20; temperature 99.8° ; hearts' sound normal. She has taken from the commencement up to this time (9.30 a.m.) eleven powders, equal to 330 grains of salicin; to be continued thirty grains every two hours. At 7.15 p.m. pain disappeared, and requires to get up; complains then only of a slight degree of deafness. She has perspired a good deal, reaction acid. When she tries to move the joints they are stiff, but can be firmly pressed without feeling pain. Pulse 76; respiration 20; temperature, 98° ; heart's sounds normal; in all has had exactly one ounce of salicin, equal to sixteen thirty-grain doses.

The salicin was continued for four days in gradually diminishing doses, patient still kept in bed when the salicin was being administered. At the end of the four days she was permitted to get up, and the same remedy was given for a week longer three times a day.

Result.—She has no return of pains, and was perfectly recovered of her illness.

Comment.—We may in this case perceive that the acute pain was abolished within six weeks; and all the tenderness of the

joints within twenty-four hours of the time treatment commenced. Furthermore, a fall of five degrees had occurred, and the temperature within that duration had fallen from 103° to the normal standard.

CASE III.

George D—, aged 29.—Well-built man, and quite robust. For the first time for four years he had rheumatic fever, was then laid up in bed for two months, and then was off his work.

September 4th, 1881.—He was two days ago seized with pain in right knee. The left became painful, and that very painful, although yesterday the right was a little better.

Third Day.—The left ankle and right shoulder was also affected ; of the affected joints the right knee is the only one that was swollen, and that slightly. The other joints were very tender, but none of them red. From the severity of the pains he had little or no sleep last night. Tongue furred ; bowels relieved by purgatives ; urine high-coloured and depositing urates ; skin moist ; perspiration acid ; pulse 100 ; respiration 22 ; temperature 101° ; heart normal.

Treatment.—To have thirty grains of salicin every hour for six hours, then every two hours.

September 5th.—Felt better after taking four powders, and was soon relieved from pain before night, and he slept well, waking only twice, on each occasion taking a powder. He has altogether taken ten of them, which is equal to 300 grains of salicin. In the morning he was quite free from pains. Feeling so well that morning he got up and dressed himself, and at visiting time was found walking about in the room. He was, however, ordered to his bed. In bed was quite free from pain ; but when walking about felt his left knee and ankle a little painful. Skin covered with acid perspirations ; urine less scanty, of amber colour, with slight deposits of urates ; heart normal. At his getting out of his bed his pulse was 88 ; respiration 20 ; temperature 98.8° .

Treatment.—A powder every two hours. During the day he perspired freely, and feeling so well at eventide he got up again for a couple of hours.

September 6th.—All night slept very well. He took no powders between ten last night and seven this morning. *In toto*, has had eighteen powders, equal to 540 grains; perspiration was freely secreted, which was acid; has now no pains; swelling and tenderness quite gone; pulse 72; respiration 18; temperature 98·2°. The salicin was ordered to be taken three times a day for ten days; he remained well, and resumed his duties again on the 17th. In this case we notice that the attack was abolished within twenty-four hours

CASE IV.

W. W——, Esq., jun., aged 20½.—Has had Rheumatic Fever three times, first attack at the age of 13, which very much affected his heart, and was laid up in bed off and on, for over two months. Second attack at the age of 18, which was a short but stiff one, it did not at this time affect his heart. In both attacks he was affected with extreme pains in all his limbs. The pain steadily got worse and localised in the joints. Third attack at the age of 20½, began with malaise and extreme pain in the head.

May 10th.—Skin moist and hot; expression anxious; tongue furred; urine high coloured and scanty; pulse 116; respiration 24; temperature 102·5. Ankles, knees, right shoulder, and finger of right hand were swollen and painful. The heart sounds normal.

Treatment.—To take thirty grains of salicylate of soda, in combination with some alkaline as prescribed by Dr. Garrod.

On the 13th he was much better. Felt easier after the third dose, limbs were all wrapped in medicated wool. Had a good night's rest, but perspired a great deal; is now covered with acid perspiration; saliva is also acid. The swelling is all but gone from the joints, and there are no pains except when they are

moved or pressed. Heart normal; pulse 92; respiration 20; temperature 99·6°. Took the medicine every hour for four hours; has had in all about nine doses, equal to 270 grains. Felt better, but he speaks of feeling somewhat squeamish. To take now a dose every three hours.

June 6th.—Feels well, only weak. There is no swelling, and no pain even on pressure over the joint. Acid perspiration continued; pulse 98; heart normal. He remained well, but took the salicylate thrice daily for a week.

Comment.—The patient, not being under my direct treatment, further comments is therefore unnecessary. The young gentleman, however, is now perfectly well again, and enjoying good health from the beneficial results afforded him by salicylate of soda.

CASE V.

John A——, aged 28.—Never had rheumatism before January 10th, 1882. Four days ago commenced with an attack of general aching and sore throat. The pain is now localised in the left knee and both ankles and right shoulder. The affected joints were slightly swollen, except the shoulder, and all seems intensely tender though the pain is not very acute when he is at rest. The slightest movement seemed to aggravate the pain. The skin is covered with acid perspiration; tongue furred; urine high-coloured, and loaded with fawn-coloured urates; bowels moved by purgatives; the heart's sound was normal; pulse 102; respiration 22; temperature 100·6°.

Treatment.—To have twenty grains of salicylate of Soda every hour till pain is decidedly relieved, then every two hours.

January 11th.—He was very much relieved and felt better after the administration of six doses of the medicine, but I advised that the hourly doses should be given for eight hours. He slept well after that, and woke up occasionally during the night. Up to this time (10.30 p.m.) he has had thirteen doses, which is

equal to 260 grains of the salicylate. The pain is gone, but the joints were stiff and slightly swollen. Perspires freely; secretion acid; pulse 82; respiration 20; temperature 97·8°.

January 12th.—Pulse 68; Respiration 18; Temperature 98·2°. Heart normal.

Treatment.—To take the salicylate four times a day for four days, and thrice daily for a week more. (N.B.) In this case we find, that in those who have not suffered from long and repeated attacks of rheumatism, likewise in young subjects, and more so if the remedy is not administered in sufficient duration—such is generally the course of events.

It is of importance, however, that those two conditions should be observed, for if given in insufficient quantity, the desired result is obtained very slowly, or not at all; and if omitted too soon, the symptoms are apt to recur. I have appended, by way of contrast, a representation of the temperature range of two cases given in “Aitken’s Practice of Medicine,” and likewise one of Winderlich’s, which recovered, and one of Dr. Ringer’s, which proved fatal. The analogy between my five cases with them are too startling for comment. These five, however, are representative of many others.

The frequent relapse of the disease in patients treated with salicyl compounds, has been noted by many; and I think myself that the too early omission of the remedy, or its administration in insufficient quantity are the attributable causes in many unsuccessful cases. For example, the undermentioned cases will demonstrate this point which we are now considering.

CASE VI.

Louisa W.—, aged 24, had rheumatic fever three years ago; she was then laid up for two months. Her present attack began, five days ago, with malaise and pain in her limbs, (May 12th, 1881. Her face anxious and flushed; right knee, ankle,

and wrists, swollen and exceedingly painful ; perspiration acid ; scanty urine and loaded with urates ; pulse 104 ; temperature 102.4° ; heart normal. Treatment : To have light diet, and thirty grains of salicin every hour till pain is relieved, then for every two hours thirty grains.

May 13th.—For five hours took a powder every hour, felt easier after that, and in every two hours, while awake, she took one ; in all, she has had thirteen powders, equal to 390 grains. The joints are stiff and slightly swollen, but not tender ; she is now free from pain ; pulse 80 ; temperature 99.8° ; skin covered with acid perspirations ; bowels moved ; heart's sound normal. Treatment : To have a powder every two hours till a dozen are taken, and then for a week, one every four hours, and during that duration she is to remain in bed. The patient felt so well that the mandate was neglected ; she got up on the 16th, and after that time she occasionally took a powder.

On the 14th the pain in her joints returned, and on the 15th my usual visit was paid, when I perceived a return of the old symptoms. Her knees, ankles, and wrist, were inflamed ; acid sweats ; pulse 100 ; temperature 101.9° . Treatment : For six hours she has had, every hour, thirty grains of salicin, and then every two hours afterwards.

On the 16th she was free from pains. Pulse 75 ; temperature 97.4° . Has had 360 grains of salicin—to continue it every hour for four days—and, after that, four times a day for ten days. The command at this time was attended to as directed, and she remained well.

Observations.—There can be no doubt, in this case, that the relapse would have been prevented had the patient gone on with the salicin, as she was directed so to do at the first onset. The results, therefore are as follows, viz. :—

(a) On the first attack the salicin was taken long enough, and the quantity was sufficient to destroy nearly, but not quite, the whole of the rheumatic poison.

(b) What remained was, as it were, reproduced, and evidently gave rise to a renewal of the rheumatic symptoms.

(c) The drug was taken for a sufficient duration, and in sufficient quantum, for the destruction of the whole poison ; this was done on the second day's use.

(d) Permanent convalescence was therefore the result.

CASE VII.

Thomas J—, aged 40, was troubled with rheumatic fever when he was 27 years of age, a second time when he was 29, a third time when he was 32, and a fourth when he was 37. He was confined to his house for three months on the first attack, and was unfit to work for another six months, duration in all, nine months. The period of the second attack was equally long : he was in bed for six weeks during the fourth attack, and off work for three weeks. Treated always by potass, I observed that chronic shifting pains after each attack continued to trouble him, for some time after the more acute symptoms had disappeared. When first he returned to his work, after his ailment, so stiff were his joints, that it took him three quarters of an hour to go a quarter of a mile.

A fortnight after, he began to suffer from twinges of pain in the back, neck, and right leg : got much worse, a few days ago, and was obliged to take to his bed. The pains have been so severe for two nights, that his nights' rest were disturbed.

March 10th, 1882 (3 p.m.)—Has anxious expression ; tongue furred, bowels confined : skin perspiring ; perspiration and saliva acid ; pulse, 116 : respiration 28 ; temperature 101.1°. On his left knee he complains of great pain, likewise all along his right leg, knee, and hip joints of the same side. The neck and the right wrist and hand are also painful and tender to touch ; the affected parts are tender, but not red, or distinctly swollen.

The heart's sounds are free from bruit, but somewhat muffled in

character, and there is a slight click with the systole. Treatment : to have an aperient and thirty grains of salicin every hour.

9 p.m.—Bowels moved ; has had five powders, which is equal to 150 grains of salicin. Altogether feels better in himself. Felt easier after second powder. Expression improved. His right leg can now be moved, which it was impossible for him to have done in the morning. Moves the arms more freely, and his head with less pain. Has slept more this afternoon than hitherto he has done for the past two nights. Heart's sound and breathing unchanged. Pulse 108 ; respiration 27 : temperature 102.2°. Now perspiring more freely. Acid perspiration. Treatment : continue powders, one every hour while awake.

2nd, 8, a.m.—Every hour till 3 a.m., took a powder, at that hour he fell asleep and slept on till 7. Up to this time he has had sixteen powders, which is equal to one ounce of salicin. Remarks of having no pain, only of stiffness of joints and limbs ; can bear firm pressure anywhere. Feeling so well he got up, and at time of visit he was sitting in front of the fire free from pain, but rather stiff and weak. Skin acting freely ; perspiration and saliva acid ; pulse 100 ; respiration 98.4°. He declines to think it possible that he is feeling so well. Treatment : To keep in bed, and take thirty grains of salicin every two hours.

8 p.m. — Quite free from pain, so much so that he neglected his medicine, and went from his room into a cold-water chamber. Was troubled with no pain, but his pulse was 108 ; the respiration 30 ; and temperature 101°. A slight click with the first sound of heart, but the muffled character of the sounds has disappeared. Treatment : To remain in bed, and every hour to take a powder.

3rd, 9 a.m.—Slept from nine till three without waking. *In toto*, had a very good night's rest, felt quite well, then got up and went into another room, and by so doing he felt weakened and chilled, and again he slept from three to six. Has no pains, but feels weak. Abundant perspiration and acid ; pulse 91 ; respiration 28 ;

temperature 97.1° . Treatment: To have salicin, thirty grains, every two hours.

4th.—Passed a very good night, he awoke only once, and that for a short duration; feels quite well; heart's sounds normal; acid perspiration continues; pulse 76; respiration 20; temperature 97.2° .

At this crisis my visits ceased, but mandate was given that the salicin must be administered every four hours, for a week, in thirty-grain doses. I was, however, called for again to visit him a week afterwards. He mentioned to me that he was feeling so very well that he did not trouble to take the medicine regularly as instructed, but he only took half a powder occasionally—practically speaking, the salicin was omitted. The weather at the time was bitterly cold, and he very foolishly put on his clothes and went about the house.

On the 9th the pain recommenced.

9th, 3, p.m.—Both ankles and right wrist, all of which are swollen and very tender, but not red; skin hot, not perspiring; pulse 100; temperature 102.3° ; heart's sounds normal. Treatment: To have every hour thirty grains of salicin.

10th.—After five powders (150 grains) fell asleep, and passed a very good night, awake only once; pain disappeared; only stiffness on pressure remains. Heart normal; pulse 100; temperature 101.6° . Treatment: To continue, every hour, salicin—in all, has had 210 grains.

11th.—Has scarcely any pains, but feels rather wretched and out of sorts; the joints are not swollen, but are more or less tender on pressure. Acid perspiration, not very abundant; pulse 99; temperature 100.3 ; heart normal. Has had, in all, 540 grains of salicin. Treatment: To have thirty grains of salicin, and fifteen of bicarbonate of potass, every two hours.

12th.—No special pain—tenderness on pressure continues—in a word, patient is very much the same. Slight perspiration, but distinctly acid; pulse 100; temperature 101.2° . Treatment: To continue powder. In all, has had 750 grains of salicin.

13th.—Pain and tenderness disappeared. Pulse 90; temperature 97°. Feels very much better. In all, has had 930 grains of salicin.

14th.—Feels quite well, only weak. Pulse 76; temperature 97; appetite good. On this occasion he was very careful; he remained in his bed for a week, taking salicin for a fortnight, and without any drawback made a good recovery.

Observations.—We may notice in this case that a decided relief was effected within six, and has disappeared within twenty hours of the time he came under notice. Likewise, we observe that the temperature had fallen to the normal standard; and more so, that during the first attack there was a neglect of the salicin, which was an alleged cause for the rise of the temperature from 98.4° in the morning to 101° in the evening. This was, however, displaced by the resumption in hourly doses of the drug, which result was a speedy fall to the normal. We should therefore conclude, that the second attack must be freely attributed to its early omission. But here we find that the beneficial effect of the salicyl compounds are not always so marked as in the cases which have been proved. We shall, however, notice that in the next cases, those more especially who have suffered from repeated and long-continued attacks of acute and subacute rheumatism, these remedies often fail to give the speedy and complete relief which, as it were, follows their administration in earlier attacks. An illustration will be found in the case I am about mentioning.

CASE VIII.

Henry D——, aged 35.—For fifteen years has been a martyr to rheumatic attacks. The first occurrence was when he was 19. Since then he has seldom gone more than a year without being laid up with it for some weeks. During the earlier attacks he was generally laid up, at times for two or three months, and his recovery, although slow, was a perfect one however.

About five or seven years ago he made mention that his attacks, though really less severe, did not disappear as they ought to, incomplete recovery, and the joints remaining more or less stiff. The stiffness became more marked as time moved on, and on a repetition of the rheumatic attacks, the pains were more constant, and his condition became more and more helpless. He has been quite incapable for any duty for two years, and during winter and spring months he was totally unable to go out for fear of taking cold, and thereby making himself worse. The weather that suits him best was warm and dry ones. Very much he has suffered with his wrists, and they are now so stiff that his hands are practically useless. In short, the case has become one of what is commonly called or nominated chronic rheumatism, and there is a variation every now and then by a subacute seizure. The occurrence of the latter is by an irregular intervals and periods. In one of his attacks I saw him, and up to the within time he came under observation he has been better than usual. For nearly four weeks then he had been confined to his bed. His face had an expression of anxiety and pain; skin moist; perspiration scanty and acid; tongue slightly furred; pulse 95; temperature 100.2° ; urine high coloured, sp. gr. 1023; no albumen, no sugar, depositing urates on standing; the heart's sounds were normal. The elbows, wrists, fingers, knees, and ankles were stiff, swollen, and painful on pressure, and more so on movement; those mostly complained of were the wrists, knees, and ankles. In the shape of the joints there was no alteration and no deformity, except such as was attributable to a general thickening of their fibrous textures, and this specially marked thickening is mostly observed in the wrist.

Treatment.—To take thirty grains of salicin every two hours; after 300 grains had been taken, on the following day he decidedly felt very much better, and a marked improvement in his constitution; and also that he experienced more beneficial relief from the powders than hitherto he had done with any medicine he has

ever had before. In the appearance of the joints there was no change whatsoever ; movement and pressure now caused less pain. The pulse was 83, and the temperature 97.7°. He himself feeling better, and comparatively free from pain so long as he kept quiet. In two days' duration he seemed improved a little, but it soon became evident that the salicin was doing no further good, the stiffness and swelling of the joints being undiminished. After 1,600 grains had been taken, the drug was omitted at the end of eight days.

The physiological effects were very distinct during the last three days of its administration. For a duration of two days salicylate of soda was then given in twenty-grain doses every two hours, and for five or more days longer every three or four hours. The result therefore, was a feeling of depression and nausea, but the pain was not in any way relieved.

External application of blisters to the affected joints. Internally, iodide of potass and an opiate at night. He improved considerably under this treatment. The subacute exacerbation was got over, but the state of chronic thickening and pain on movement however remained. The circumstances of the patient was such that other treatment than that which could be applied at home was totally inadmissible.

Observations.—The notification of facts in this case are as follows, viz :—

- (a) The long continuance of the disease.
- (b) The frequency of the attacks.
- (c) The permanent nature of the danger done to the fibrous textures.
- (d) The beneficial results obtained from the salicyl treatment during its administration of the first day or two.
- (e) The failure of that treatment in thoroughly removing the then known symptoms, and thereby to rectify the morbid changes.

The indications for treatment that came under notice in this case was an attack of subacute rheumatic inflammation of those

altered fibrous textures ; two distinct morbid conditions therefore, present themselves for treatment, viz :—

(a) The subacute inflammation of the fibrous textures, due to the present and direct action of the rheumatic poison.

(b) Irritation of these textures, which is the result of past rheumatic attacks and a state of chronic thickening.

In virtue therefore, of the anti-rheumatic action of the salicyl compounds the former was allayed by it, but on the latter its action availleth nothing. The conclusion, therefore, amounts to nothing more or less, then that the beneficial results and effects were solely confined to its administration during the first two or more days.

For example, a similar, but somewhat less marked state of matters is laid down in the undermentioned case.

CASE IX.

David W——, aged 42.—Five times had suffered from rheumatic fever (viz.) at the ages of 19, 23, 27, 30, and 36. The first three attacks were very prolonged, and on each occasion he was confined to his bed for two or three months, and for five months he was unfit for any work. The last two attacks were shorter ; his recovery, however, was less perfect, as some degree of stiffness of the ankles, knees, and wrists seemed remaining.

The present attack, which is the sixth, began two days ago with pains in his back and limbs ; he has had no sleep for many nights owing to the severity of the pain, and was obliged to take to his bed.

March 10th.—Anxious and pained expression ; furred tongue, and moist ; skin covered with acid perspiration ; urine scanty, loaded with urates ; pulse 112 ; respiration 25 : temperature 102°. In right knee and hip, ankles and wrists, he experienced great pain, the last named joints are all swollen and tender. Heart's sounds normal.

Treatment.—To have an aperient and thirty grains of soda Salicylate for six hours, and after that every two hours.

11th.—Has had in all 450 grains of salicylate (which is equal to fifteen doses). After the fourth he began to improve, he was now so free from pains that he slept soundly for three hours, with an exception when the joints were moved or touched. On the whole, he was quite free from pain. Skin covered with acid perspiration; pulse 88; temperature 98.2°; heart's sounds normal.

Treatment.—To have an aperient and thirty grains of soda salicylate for six hours, and after that every two hours.

12th.—Has no pains so long as he remains quiet. Slept well; movements recall the pains; joints are tender, still slightly swollen, more so the wrists and ankles. Pulse 83; temperature 98°; scanty acid perspiration; complains that the medicine makes him feel sick. Instead of his having the salicylate, he is to have now thirty grains of salicin, every three or four hours.

13th.—Sickness disappeared, prefers the salicin. Pulse 79; temperature 97.8; the affected joints as before. The salicin was continued for four days later, and there was no change in his condition. On movement or pressure, the joints, which were slightly swollen, was rather painful. The temperature remained from half a degree to a degree about the normal; hyper-acid secretions continued. After the expiration of the fourth day the salicyl treatment was omitted, and he was ordered five grains of iodide of potass, and fifteen grains of bicarbonate of potass in an ounce of water every four hours. He quickly improved under this treatment, the affected joints became less tender, the acid state of the secretions gradually passed away, and in ten days time he was able to get up. For some time however, his joints and ankles remained stiff, and they had not quite recovered when he last passed from notice, my last visit having terminated four days after.

Observations. The physiological facts to be noted in this case are as follows ; viz.—

(a) That the acute symptoms were speedily allayed by the salicyl treatment, but in curing the disease, it thoroughly failed.

(b) After a time, it ceases to have any so-called beneficial influence, and what the salicyl failed to accomplish the potass treatment did, and that satisfactorily. The question now offers itself, Why was this? The answer should be, the salicyl so speedily allayed the acute symptoms, on account of the virtue of its anti-rheumatic action. The patient was not however made well. Why then, did it not thoroughly remove the disease? There are, therefore, two separate morbid conditions to be dealt with in the case of this patient, and my reason for so doing is as follows.—(a) This present attack, which is the sixth of rheumatic fever. (b) The five previous ones had left their marks on him, in the form of some thickenings and abnormal susceptibility of the involved textures ; and (c) in the sixth ailment, the two morbid conditions with which we had to deal with, were—

(1) The recent inflammation of the fibrous textures, consequent on the present action of the rheumatic poison.

(2) By the previous rheumatic attacks, the chronic irritation of these textures were produced. In the former condition, that was speedily allayed by the salicyl treatment, the latter was one, however, over which such a treatment could have no control. During the early days of the sixth seizure, the lactic acid no doubt having been formed, kept up this irritable state of the fibrous textures, and by counteracting this agency, and aiding in its elimination, it was therefore probable that the alkaline treatment did so much good. The altered fibrous textures were relieved from the irritating action of that acid, and prior to the sixth seizure, it permitted them to return to the condition in which they were before. N.B.—A morbid condition, which is of great importance that we should recognize, shows themselves as a vivid illustration in these two cases. Rather

than a distinct form of the disease, we should place it down, as a sequence of rheumatism ; as the seat of repeated rheumatic attacks consists essentially in chronic thickenings, and chronic irritability of fibrous textures.

The history of acute rheumatism therefore shows, what a very slight knowledge of pathology would indicate, that the textures which have been the seat of inflammation, do not recover their natural tone as soon as the said inflammation ceases. Observation generally indicates to us some thickening of the fibrous textures of the affected points, causing that stiffness which is often felt after the acute symptoms have disappeared, and remaining for some duration, which accordingly varies with the length and severity of the seizure. In the fibrous textures, if the attacks are obstinate and frequent, the morbid change becomes less and less perfectly recovered from ; and by each succeeding seizure a little more damage is positively done, which ultimately is permanent, and there is induced a condition of chronic thickening of these textures.

That such a change should occur, as a result of long continued and frequent rheumatic attacks, consists with what little we now know of the mode of production of similar pathological changes in other organs. Sir William Jenner has some time ago demonstratively shown, and more, or less, all pathologists admit the accuracy of the observation, that the continued presence in an organ of an increased quantity of blood gives rise to indurations of its substance, that is, to increase of its fibrous tissue. If such a change occurs in organs like the liver and kidney, of whole fibrous structural tissues, which forms a comparatively small part, it is therefore much more likely to occur in capsules and ligaments, which are entirely composed of it.

Again, when an organ has been the seat of repeated attacks of inflammation, our experience in clinics suggests to us that the local symptoms to which such inflammation gives rise, are apt to recur in a minor degree from the operation of causes, which would not have been sufficient to induce the original attack.

As a sequence of one or more acute attacks, and for the course of the chronic malady to be, as it were, interrupted by subacute seizures, brought on by causes which would not have sufficed to induce the original disease for example, — a case of chronic bronchitis,—is not this an inadequate proof?

The readiness with which dysenteric symptoms may be developed in those who have once suffered from the acute form of the disease, is a very similar instance ; causes which could never have originated the disease, will often at times recall some local symptom of the original attack, in a form milder, but still quite characteristic ; this we may suggest as a course, cold and damp, and all various exposures, over-fatigue, and mental disturbance. So, likewise, in a case of repeated rheumatic attacks, the fibrous textures become somewhat weakened and altered. They are rendered irritable and weak by the changes which have taken place in them, and are apt to be disturbed by agencies which have no effect on healthy fibrous textures. Irritation of fibrous textures, therefore, causes pain in the affected part, no matter how induced ; so, also, does such disturbance as arises in those altered textures from an exposure to cold and damp, give rise to the same symptoms, as would result from the action of the rheumatic poison. In true rheumatic attacks therefore, occurring in those who have decidedly given evidence of being of rheumatic constitution, and characterized by symptoms which are associated with what we may so name true rheumatism, it is not unnatural that the originating symptoms should be regarded as due to the action of the rheumatic poison. But such a view seems pathologically inaccurate, and more so, pregnant with therapeutic errors. Though originally induced by repeated rheumatic attacks, the condition which has to be dealt with, is one which exists after its so nominated development, and that independently of the cause which gives such rise to it. Its resemblance should, therefore, be compared to that which so frequently follows mechanical injury to the fibrous textures of a joint ; as we all know by surgical experience,

that when a joint is severely strained, the result is more or less a marked injury to the capsular, ligaments, and tendons of the parts affected ; this injury may be so great, as to cause permanent change in, and thickening of these textures. The seat of pain, which somewhat seems indistinguishable from that of rheumatism, are frequently the occurrence in such altered tissues, and such pain, is therefore, often induced by some other disturbing causes as before stated, exposure to cold and damp, &c.

It is the same with the altered state of the fibrous textures, which as I have previously mentioned, is a result of repeated rheumatic attacks, cold, damp, east wind, and change of weather, and is sufficient to induce the same irritable and irksome pain which was caused originally only by the rheumatic poison.

The salicyl compounds can exercise no control whatsoever when the fibrous textures are in this altered and susceptible condition, for by many other causes than the rheumatic poison irritation may be set up in them. The symptoms of such irritation therefore are generally the same, no matter how induced, just as like symptoms would result from similar disturbance set agoing by the rheumatic poison ; and likewise pain, swelling, slight rise of temperature, even increased formation of lactic acid, may result from inflammation of these altered fibrous textures induced by cold ; so may we thus have all the symptoms of subacute rheumatism, without any action of the rheumatic poison.

For a certain duration, the salicyl treatment will hold good, *i. e.* if the subacute exacerbation be due to the action of the rheumatic poison. It will however, fail to cure, because the irritable textures will take some time to regain their normal condition after the rheumatic poison has ceased to act ; and, furthermore, because the lactic acid, found as a result of their inflammation, tends to keep up disturbance in them ; and such a case, treated by salicylic acid or salicin, would be, and in justice, instanced as one in which only partial and temporary relief are afforded by these compounds.

Again, the compounds of the salicyl would have no remedial effect, if the so named subacute exacerbation were due to the action of cold, or exposure, and the case would with justice be given as an instance in which these compounds failed to give any relief, though the doses were frequent and full. The alkaline treatment does more good, as I have previously mentioned, in those cases in which the fibrous textures have been the seat of previous attacks of rheumatic inflammation; and a resulting change from the former attacks renders those textures more irritable and vividly liable to an untoward disturbance from the pressure of lactic acid. After the action of the rheumatic poison has ceased, the local symptoms are apt to persist for some duration, as a sequence of the disease. They seemed maintained by the lactic acid, and should there be anything which, tends to hasten the elimination of this from the system, the duration of the attack is shorter.

Remarks.—In such cases, therefore, should the alkaline treatment be prescribed, a combination with one of the salicyl compounds will prove beneficial; *e. g.* we will find that, firstly, the alkaline process will aid in the elimination from the system of the lactic acid found during its formation, and secondly, the salicyl will put a stop to the rheumatic process, and will effect a rapid cure, when we want to deal with a first or second attack; but should the patient have suffered from repeated attacks, and when as a sequence to these more or less change has been induced in the fibrous textures of the joints, there can be no doubt whatever, that alkaline treatment tends to shorten the duration of the malady; for the neutralizing of the lactic acid, and aiding its elimination by other organs than the skin, are solely performed by this agency. The rheumatism, so properly termed, they do not cure; but, during their course, they seem to hasten the elimination of morbid products that are there formed.

In comparing, therefore, the frequency of the occurrence of the acute and subacute forms of rheumatism in which it originates, we find that the chronic thickening of the fibrous textures is in-

creased, at least, in its fully developed form. Two reasons, therefore, suggest themselves, firstly, that it is only in a minority of cases that the rheumatic constitution is so marked as to lead to long continued attacks, and sufficiently frequent for its production ; and, secondly, we observe that the heart suffers as well as the joints, and that death ensues from the cardiac trouble, before there has been sufficient time for the development of permanent thickening of the fibrous textures ; this, it appears to me, is a condition over which drugs exercise little or no control ; the salicyl compound should therefore be administered for some duration, *i.e.*, not with the idea of removing the chronic thickening, but with the object of relieving any purely rheumatic symptoms.

The baths of France and Germany hold out the best prospect of relief in the treatment of chronic thickening of the fibrous textures ; likewise do sulphur baths, arsenic, guaiacum, iodide of potass, &c., which may be tried with good results ; blisters and rubefacients oftentimes afford considerable relief.

It should be of very great importance to the prescriber that the diseases should not be confounded together ; for their prognosis and treatment differ essentially ; occurring, as the latter does, in those who have suffered from a repetition of acute or subacute rheumatism, it could scarcely fail to be mistaken for the chronic form. Chronic rheumatism, therefore, is the ailment for which the condition of the thickening of the fibrous textures is most apt to be mistaken. The so properly named rheumatism is due to the presence and direct action of the rheumatic poison, and its direct condition is very difficult to diagnose for it is not accompanied by any perceptible change in the textures involved ; it simply consists in rheumatic disturbance of the tissues affected. From the acute and subacute forms it differs, not in nature, but in degree, and at times in the special textures involved. A rheumatic attack is true in which the morbid process and local disturbance are not so differently marked, sufficiently, as to lay the patient up, or to raise the temperature. The textures involved are the same as those

which differ in the acute and subacute forms, only with this difference, that the fibrous aponeuroses and muscles are more apt to be affected.

For clinical purposes, therefore, cases of chronic rheumatism might, for sake of convenience, be divided into two classes, viz., chronic articular rheumatism, and chronic aponeurotic or muscular rheumatism. The joints that suffer in the acute and subacute forms of rheumatism, are, likewise, the same in chronic articular rheumatism ; very rarely more than one or two joints are at the same time affected, and the pains are never bad enough to lay the patient up. The disease may, however, shift from one joint to another, and may last, off and on, for months, and even years ; and during this long duration the patient never really feels ill, and yet never for more than a few weeks at a time does he feel quite well. The undermentioned cases will serve as an example.

CASE I.

Mrs. R——, age 32.—Suffered from rheumatic fever when she was 14. At that time was confined in bed for two months. At 25 she had for the second time another attack of a much milder form, which duration was only seven or ten days. She is the mother of six children. She speaks of having suffered from joint pains almost ever since her first attack. *In toto*, feels well, and free from pain ; but for some months back she has had it very constantly, but not bad enough to prevent her moving about.

March 10th, 1882.—Suffered very much during the winter, was unable to go out of doors, as that makes her get worse. Now suffering from severe pain and stiffness of knees, ankles, and wrists ; the last are a little fuller than natural ; heart normal ; pulse 70 ; temperature 97.4°.

Treatment.—To take 30 grains of salicin every three hours.

11th.—Feels better than hitherto she has done for months. Pain nearly disappeared. In all, she has taken thirteen powders, which equal 390 grains of salicin.

12th—Feels much better, and free from pain, with the exception of a slight stiffness of the joints.

CASE II.

Jonathan W——, age 36.—When 20 years of age had an attack of rheumatic fever; was laid up then for two months. He has occasionally suffered from pains in the joints almost ever since, and the location of the pains are the knees, ankles, and wrists; one joint is occasionally affected at the same time. The pains for the last few months have been somewhat irksome, more so in the right knee.

November 20th, 1881.—In right knee and ankle experience much pain. Each joint seems tender, but no swelling is perceptible in the joints. Heart sounds normal; pulse 73; temperature 97.5°.

Treatment.—To take every two hours 30 grains of salicin.

21st—Very much better.

22nd—Free from pain, and more comfortable than he has been for months. In all he has had 360 grains of salicin. This he continued thrice daily, in 20 grain doses, for several weeks, and for some months. According to directions, he is to continue twice daily. This he continues off and on, and he says he has never felt better in all his life.

N.B.—In the acute and subacute forms the heart is less apt to suffer, more so than in the chronic, but occasionally this becomes involved (*c. g.*).

CASE III.

Thomas K ——, age 37.—Had suffered from occasional rheumatic pains. He shows, on physical examination, notable cardiac symptoms. There was marked regurgitation at both aortic and mitral orifices, and the heart was much enlarged. His ailment, however, was not one of a severe character, except about a fortnight ago, when he experienced pain in his knees, ankles,

and occasionally in the elbows, but very seldom in more than one joint at a time. The pain shifted about very frequently; the left knee, however, seems to be the chief seat. On no occasion was he unfit for his duties, until the time previously mentioned. Has been short of breath for some time, but he generally regarded it as asthmatic in nature. The right knee now occasionally became the seat of pain. The cardiac ailment increased, and he died suddenly of the above, months after.

Close examination will show us that rheumatism of the muscles and aponeurosis nearly generally assumes the chronic variety. At times, however, the course of an acute and subacute attack of the aponeurosis, more especially that of the thigh, may be presented. The occurrence of such a rheumatism by itself, and that independently of the articular form, is nothing more nor less than chronic. This variety, as I have previously mentioned, occurs more commonly in women than in men, and when it does so in the latter, it is more generally at an advanced age, than the acute articular form of the disease. The location of it are the loins, shoulders, and thighs.

So closely allied are the two structures, viz., the muscular and aponeuritic, that it becomes a question whether or not the fibrous aponeurosis ever suffers without the muscles being involved, and whether or not the muscles ever suffer without the aponeurosis being affected?

In the articular form of this disease there is no aptness to shift about; we shall, however, observe pain dull and aching in character, which is increased by movement and pressure, and varies accordingly in degree.

Observations.—Gouty pain and neuralgia are oftentimes mistaken for this malady. Our diagnosis then will be—that in the gouty state it is most common in men; by the age, sex, and history of the case; and, further more, general evidence of its existence either in previous attacks or signs of the present state of the joint, or the health in general. (*Vice versâ.*) In neuralgia it is chiefly

distinguished by the dull aching character of the pain and its situation. We should likewise call to mind that uterine disease often causes neuralgia of the thighs and loins.

To illustrate this form of rheumatism, the undermentioned cases will, I hope, be serviceable.

CASE I.

Mrs. P——, age 24.—Suffered for several months from pains in her shoulders, loins, and right thigh, the pains being occasional. For the past fortnight they had become worse. The slightest motion increases the severity of the pains. Had never before suffered trouble from any joint affection, nor rheumatic fever. She is neither with any local ailment, but feels out of sorts and weak, brought on by want of sleep and pain. Pulse and temperature normal.

Treatment.—Until the pain is relieved, she is to have 20 grains of salicin every two hours, and then after, for a fortnight, thrice daily.

Observation.—In this particular case the patient was partially cured in three days; she then omitted the powders.

N.B.—After the omission of the salicin for a week, a return of the pains in the old locality was the result; consequently for three days it was again administered in 20 grain doses every two hours, and after that time she was ordered to take a powder, thrice daily, for three weeks. This mandate was duly accomplished, and the result was, that the pains disappeared, and there was marked improvement in her general condition, and she continued well.

CASE II.

Mrs. T——, age 26.—Never before experienced articular rheumatism; at the present crisis she suffered for six weeks from pains in both thighs, lumbar regions, and hips. With the point of the index finger on the parts affected, seems somewhat tender, on

pressure, but with a similar pressure with the palm of the hand, tenderness is not detected. Over the upper and outer parts of the thighs the tenderness is well marked. Variety of stimulating applications, and anodyne, have been tried without any untoward relief. Pulse and temperature normal.

Treatment.—To take 20 grains of salicin every two hours.

Observation.—On the day following she had a decided relief, and on the next, after she had had 360 grains, was all but free from pain.

She then, for a fortnight, took 20 grains of salicin thrice daily, and remained well.

N.B.—From these cases, therefore, we may arrive at the conclusion that the treatment in this form of rheumatism differs not in any way from that of the articular form of the disease, and, furthermore, the case serves to illustrate the controlling power maintained by the salicyl compounds over the rheumatic process.

Furthermore, the subacute variety of rheumatism most commonly met with in practice is not necessarily a sequela of the acute form; for acute rheumatism, *per se*, is not, as I have previously mentioned, a dangerous affection, except in so far as heroic treatment and metastasis may make it so. The former the practitioner should be guarded against, and the latter always be prepared for. Avoid doing too much whilst the ailment confines itself to superficial parts; do enough, and do not delay it, when secondary inflammation seizes any deep seated organ. But, as I have said, there is no danger so long as the limbs only are affected; the ailment may be tedious and painful, but it will be little else; good management will lessen both the duration and the degree of the attack.

In the majority of cases acute rheumatism wears itself out, so to speak.

In ninety-nine of every hundred cases of sub-acute rheumatism that you meet with, you will find that the ailment exists *per se*, and had not acute rheumatism for its precursor. Sub-acute

rheumatism chiefly seizes upon muscular parts, such as the shoulders, loins, and hips, or parts well supplied with ligaments, as the knee, ankle, and wrist. It is more liable than acute rheumatism to affect muscles solely, and is less liable than this to metastasis to internal organs. In its transference from superficial to deep seated parts, it rarely shows an increase of activity, at least, of an inflammatory nature. Sub-acute rheumatism is not a sequela of the acute form, as I have said ; it differs from this in the absence, or the great mildness of the sympathetic fever, and in the local affection not furnishing distinctive evidences of inflammation. The parts are swollen, stiff, and painful, but they are not redder than natural ; there is rarely an increase, and often a diminution of heat. This, in an artificial form, generally increases the pain, and since, the ailment has sometimes been denominated "cold rheumatism ;" to distinguish it from the other, which was called "hot."

In sub-acute rheumatism there is more or less acidification, but not to the extent observable in the acute variety ; but the gastric and hepatic disorder is often much more manifest in the former than in the latter ; this again is seldom, the other often, hereditary ; this never becomes chronic, and generally leaves the patient as he gets older ; the other is always prone to recurrence to chronicity, and to aggravation in old age.

There is an obvious pathological relation between acute and sub-acute rheumatism, but still there are items which point out their distinctness, the chief of which is, that they do not run into one another.

The treatment of sub-acute rheumatism is not a matter of difficulty, except in so far as the task is often a tedious one. The indications to be fulfilled are both general and local : The former chiefly consists in improving the alimentary function, correcting the secretions, and imparting tone to the system ; the latter in soothing or strengthening, as the case may be, the suffering parts.

The undermentioned cases will illustrate.

CASE I.

Mary H—— æt 56, was admitted into the hospital on the 5th of November last ; she was the subject of rheumatism in a sub-acute and severe form, which was of about five weeks' duration. She had often suffered from it before. The affected parts were chiefly the shoulders, back, and knees. Her tongue was coated with a yellowish white fur, appetite bad, bowels costive, urine scanty, and depositing a copious red sediment, saliva acid. She was ordered to put her feet every night into hot soda and water, and to take the following :

R.

Sodæ Bicarb.

Pot. Bicarb. a.a ʒii

Salicin, grs. xv.

Spt. Æthris Nit ʒii

Inf. Gentianæ comp. ʒviij

Misce fait mist.

Cujus cap. coch, magna duo ter die. Cap. omni nocte,
Pil Rhei co. grs. v.

N.B. Under this form of treatment she immediately began to improve, and continued to do so without one untoward symptom, until she was quite well. In this state she left the hospital in nine days after her admission.

CASE II.

Mrs. J—— suffered with lumbago, was ordered the same medicine with the substitution of calumba for gentian, on account of irritability of the stomach, and the addition of a compound soap pill every night, and the soda fomentations were applied to the back. She speedily recovered.

CASE III.

James W—— æt 27, with sub-acute rheumatism in his knees of two months' standing, lithic acid urine, and acid saliva and perspiration, was ordered to have an alkaline bath at bed time, and the following mixture.

R.

Salicin, grs. xxx

Liqr. Potassæ, ℥ij

Tinct. Hyoscyami, ℥iij

Inf. Buchu, ℥viij

Misce, fiat. mist.

Cujus capiat, coch, ampla duo ter in dies. Cap. Pil. Rhei co
grs. v, omni nocte, hora somni.

With this treatment, he steadily improved, until the 27th, when it was found that he was suffering from synovitis in the left knee. In every other respect he was much better. I had not seen him since the day previously, but learned that on the night preceding this, his knee had become uncovered whilst he was asleep, and exposed to a draught from a window near which he lay. The knee was largely swollen, immovable, and very painful, and there were evidences of fluid in the joint.

Treatment.—A blister six inches by five, was ordered to be applied to the knee; the mixture to be continued, and the following pills were substituted for the compound rhubarb.

R.

Pil. Coloc. co.

Pil Sapon c. opio, a.a ℥ss

Pil. Hydrarg., grs. x.

Misce, in massam.

Dividenham in pilulas xii. quantum capiat ii, omni nocte.

The synovitis was not subdued for a fortnight ; and then for the swelling, tension, and weakness that remained, the following medicines were prescribed.

R

Salicin, grs. xxx
 Liqr. Pot., ℥j
 Pot. Hydriod., ℥ss
 Spt. Æthris Nit., ℥iij
 Inf. Buchu, ℥viij

Misce, fiat. mist.

Cap. coch. ampla duo ter die.

R

Pil. Rhei co., ℥lj
 Extr. Hyoscy., ℥j

Misce Et.

Divide in pil xii, quarum cap. ij omni nocte.

The knee was ordered to be well rubbed night and morning, with this liniment :

R

Lint. Camphor co ℥vj

Ft. lint.

The liniment to be rubbed over the painful parts, night and morning.

Under this treatment he speedily recovered.

Chronic rheumatism is nothing more than a persistent form of sub-acute, showing little tendency to a crisis, and rarely altogether disappearing. The vitality of the affected parts becomes diminished ; they are thicker, colder, and less moveable than natural. The most intractable kind of chronic rheumatism, as I

have in a previous chapter made mentioned, is that met with in those who have the rheumatic diathesis, or who are scrofulous, or cachectic ; those who have been exposed to cold very much, and privation ; or have suffered from extensive bleeding, and mercurialization.

In all cases of chronic rheumatism, the practitioner should push on the alkaline treatment both locally and generally. The hydriodate of potass is of vast service ; Buchu is a good vehicle, but you may give any other if you like. With old people cascarilla or cusparia is excellent, and the addition of ammonia is often valuable. Tincture of iodine to the joints, or hydriodate of potass ointment, composed of a drachm of the salts to an ounce of cerate is good, when there is enlargement of the proper structure, or nodosity. Likewise is the compound liniment of camphor very serviceable : Alkaline fomentations generally do great good ; and an opium plaster when applicable, or tincture of aconite is valuable in subduing pain. In old people, we should remember that our plan of treatment must be chiefly sustaining and palliative.

We next proceed to notice the mode of action of the salicyl compounds on the brain, producing what will be denominated rheumatic delirium and coma.

RHEUMATIC DELIRIUM AND COMA, THEIR NATURE AND PATHOLOGY.

On the brain, the administration of salicin has oftentimes been followed by delirium, which is more or less violent. At times we find that the cerebral disturbance is really and truly alarming to the medical attendant and the patient's friends. The form of delirium which accompanies inflammation of the lungs, or of the heart, so commonly occurs, if not uniformly, in the rheumatic state, when administering one of the salicyl compounds, that I shall try to describe it in connection with that delirium which arises in the course of acute rheumatic fever, under the name of *rheumatic delirium*. The opinion of Murchison and

others suggest that these symptoms are due to a disturbing action of the acid on the renal secretion, and consequent retention in the blood of excretory products. That hypothesis, however, has been set aside by the fact that delirium has been noted in cases in which there was no interference with the action of the kidneys, and no retention of excreta. Others suggest, that this disturbance may or might be due to the presence of carbolic acid, consequent on imperfect purification of the drug ; in some of the earlier reported cases, there is reason to believe that this may or might have been so ; there is no doubt, however, now-a-days, that such an explanation applies solely to a few, that the cerebral disturbance may be produced by one of the salicyl compounds of an undoubted purity. Salicylic acid may give rise to nervous prostration, without any alarming symptoms of actual delirium, but a sense of weight and oppression in the head, and a feeling of general misery is experienced.

The following description of this form of delirium accords with what I have myself seen, and what I find recorded by others, *e.g.*—A patient is seized with all the ordinary symptoms of acute rheumatic fever, and he goes on without any untoward symptoms, —it may be only for two or three days, it may be for a week, or even later—when the nurse having perhaps reported that he or she had passed a restless night or two, and wandered more or less, we find him delirious, raving, talking wildly, and, as in the traumatic delirium, disregarding entirely his hitherto exquisitely painful, and still swollen joints. The tendency in these cases is to the acute maniacal state, and to wakefulness, so that frequently the patient requires restraint, and always the closest watchfulness. As in the other acute forms of delirium, patients often die suddenly in this, evidently from exhaustion. Sometimes they quickly fall into a state of profound coma, which lasts from one to twenty-four hours, and terminates in the death of the patient.

N.B.—Moving the patients from one place to another in acute rheumatic fever, is apt to bring on this mode of termination, for

I have had several cases in which a patient was brought into the hospital late in the afternoon, having been three or four days ill of rheumatic fever, and in the course of the night he became delirious, and then comatose, and died.

The delirium is sometimes ushered in by other symptoms, which denote a more extensive disturbance of the nervous system than delirium would do. Thus, a patient will be seized with chorea-like jactitations, affecting the upper extremities and muscles of the face; and, at times, a condition almost tetanic is present, and more or less of rigidity and opisthotonos are produced. Coincident with the first appearance of these symptoms, *i. e.*,—either the delirium, or the jactitations, we find frequently, but by no means always, the first signs of inflammation of the pericardium, or of the endocardium, or of one or both lungs, or of the pleura; and, as the delirious state diverts the mind of the patient from the perception of all pain, it often happens that no other indications of the internal inflammation can be obtained than those of the physical signs, the rubbing sound, or the bellows-murmur, or the altered breathing sounds; and hence it has not unfrequently happened that, in the midst of the great disturbance of the intellect, the inflammation within the thorax has been unsuspected, and undetected. Judging from my own observation of this delirium, I would lay it down that it occurs chiefly in those patients who exhibit considerable pallor, whether that pallor be simply the result of the rheumatic state, or of that combined with the effects of a greater or less amount of blood. In a patient I have seen it brought on, who had previously exhibited no untoward symptoms, by the application of leeches to rheumatic joints, without any cardiac inflammation; and I have also seen it come on after very large bleeding, both general and topical, where there was no very extensive development of the rheumatic state, and where, also, there were the signs of cardiac inflammation. But, on the other hand, nothing is more certain than that it has come on where there has been no bleeding practised at all; and that it has got well when

bleeding, topical or general, has been practised after the appearance of the delirium.

N.B.—These cases are apt to be mistaken by the inexperienced practitioner for inflammation of the brain and its membranes, and be treated accordingly.

We now proceed to inquire whether any adequate theory of the pathology of delirium and coma, occurring in patients taking one of the salicyl compounds, can be formed in the present state of our knowledge, both physiological and clinical? This inquiry involves answers to these queries :—(a) What part? (b) What organ is affected in rheumatic delirium and coma? (c) What is the nature of the affection, and is that affection the same for each and all those various forms of rheumatic delirium, and of coma, which clinical study teaches us are apt to occur?

Apropos of the first question, it is quite clear that we cannot assign any other seat for these remarkable states than the nervous system, nor can we locate them in any other part of the nervous system than in that part which is connected with the actions of the intellect, and with that reciprocal influence between mind and body which constitutes consciousness. Can we assign them their seat in the spinal cord? Certainly not, for we know that mental phenomena are completely independent of the spinal cord. The mind may act even when the connection between the cord and the brain is cut off, of which we have many proofs both in clinical observations and in physiological experiment. The removal of the hemispheres of the brain will destroy the phenomena of thought and of consciousness, but the spinal cord may be taken away piece by piece, leaving intact the centre of respiration, and mental phenomena will continue unaffected, save so far as concerns the partial affection of consciousness which necessarily must result from severing the connection between the encephalon and those parts of the body whose nerves are implanted in the separated portions of the spinal cord. Of the existence of our limbs through the connection of them with the spinal cord, and the connection of the spinal cord with the brain, we are conscious.

Consciousness, therefore, is feeling ; the simplest act of sensation indicates consciousness. Again, so long as the trunks of the nerves of a limb are implanted in a state of integrity in the spinal cord, and so long as the connection between the cord and the brain is intact, so long will the consciousness of the connection of that limb with the body remain—so long will the mind continue to have the feeling of the connection of that limb, and it is remarkable that that feeling may be fallacious, for it will exist even after the limb has been amputated, if only the conditions which I have mentioned are present—namely, the integrity of the trunks of the nerves, and of their implanted roots. Nor can it be got rid of even after a long interval of years has elapsed from the time of the amputation.

The brain or encephalon, then, is that part of the nervous system which is most directly and most intimately connected with the mind—upon which the mind exercises a direct influence, and which, in return, exercises an influence upon the mind.

Yet the brain itself is a most complicated organ in man and the higher animals, and, therefore, we shall have to enquire what parts of this organ are essential to a normal manifestation of the intellectual actions, and to the maintenance of consciousness.

Time would fail me were I to enter upon a full physiological discussion of these points. I must, therefore, content myself with stating that there are the most conclusive reasons for regarding the convolutions of the brain as that part which is connected with intellectual change—as the “centre of intellectual actions.” It is the part of the brain which is most intimately connected with, and most readily affected by, the mind ; and it is that layer of grey or vascular matter so intricately folded upon the surface of each cerebral hemisphere which is the seat of those unceasing changes which thought may produce, or which may excite thought. It is, therefore, reasonable to believe that any departure from the normal condition of this centre would create a corresponding disturbance or derangement of the intellectual action ; or, if we admit that the

mind may be disturbed primarily and independently, then it may be stated that the primary disturbance of the mind in patients taking one of the salicyl compounds in cases of rheumatism, may derange and disturb the nutrient actions of this centre.

"When I smell a rose," says the late Mr. Mill, "I am conscious; When I reason, I am conscious; When I remember, I am conscious; When I believe, I am conscious; * * * " If we are in any way sentient, that is, have any of the feelings whatsoever of a living creature, the word conscious is applicable to the feeler, and consciousness to the feeling. It is important further to remark, that "The sensation is not the object of consciousness different from itself, but a particular sensation is the consciousness of the moment; as a particular hope, or fear, or grief, or resentment, or simple remembrance, may be the actual consciousness of the next moment." In order then to understand the physiological conditions necessary for the maintenance of consciousness, we must analyse a simple fact of sensation, viz., when I smell a rose, or when one of the salicyl compounds are administered to our patients, what are the physiological phenomena?

First, there is an impression made upon the sentient nerves; Secondly, the change wrought in these nerves is propagated to the centre of sensation; and thirdly, this change produced in the centre of sensation must be perceived by the mind in order that a true act of sensation shall be accomplished. Thus, in the act of sensation we have two classes of phenomena—one physical, proceeding from periphery to centre; the other mental, or intellectual, by which all physical change is recognised.

The impression of the odoriferous particles on the olfactory nerves, and the subsequent change in the centre of sensation, is the physical part; the perception by the mind of that change is the mental or intellectual part. The mind may be occupied with some imposing subject at the time the rose is presented to the organ of smell, and the salicin to the organ of taste; the physical phenomena will, nevertheless, take place; odoriferous particles

will impinge upon the olfactory nerves and the change will be produced in these nerves, and in the centre of sensation, but the mind being occupied with some other object will not perceive the change in that centre, and, therefore, there will be no sensation. I shall not be conscious that such an object was presented to the organ of sense. Thus, then, for the simplest act of consciousness, the co-operation of two parts of the brain is necessary, viz. :—the centre of the sensation, or that part which is destined to receive sensitive impressions and the centre of intellectual actions. The failure of the right mode of action of either of these will prevent the completion of the act of sensation ; either the physical part may fail, or the mental part. When a man is brought under the influence of chloroform, he is incapable of sensation—partly because the centre of intellectual actions is paralysed by the influence of the chloroform, and partly because the nerves are similar ; so, likewise, may we compare the salicyl compounds.

But again, when a man in traumatic delirium is insensible to the irritation which must be created when he moves the injured or broken leg, or in rheumatic delirium, the rheumatic joints ; he is so, because his centre of intellectual action is entirely engrossed with the rapid train of ideas and fancies which occupy his mind, and therefore he does not perceive the irritant change which must be produced in the nerves of the limb by the movement and displacement of the injured part. Now, the centre of intellectual actions is the hemispheric lobes of the brain or the convolutions : the centre of sensation, as I have previously remarked, is the optic thalami, and their downward continuations, the olivary columns of the medulla oblongata, and the posterior horns of the grey matter of the spinal cord.

These, then, are the parts which are concerned in consciousness, and an affection of either or both of a certain kind must more or less affect the consciousness ; an affection of the centre of sensation, by cutting off the object of consciousness—an affection of the intellectual centre, by impairing or destroying the power of perception.

An affection, however, of the centre of sensation alone, cannot impair or destroy consciousness, because still the centre of intellectual action remains intact. Such an affection may destroy particular kinds of consciousness, but still there remain thinking, belief, memory—all which are acts of consciousness, although the evidence of their integrity rests chiefly with the individual himself. But an affection of the intellectual centre may impair or destroy consciousness, even although the centre of sensation remain uninjured, in any way, for it is evident that no impression, however vivid, upon the centre of sensation, can become a sensation, if the action of the intellectual centre be suspended, and the power of perception be thus destroyed. Thus, then, we arrive at this conclusion :—

(a.) That the introduction of certain poisonous agents into the blood, either direct, or through the digestive organs, is capable of producing rheumatic delirium, and coma.

(b.) That a deteriorated and poisoned condition of the blood is favourable to the production of delirium and coma, as in the cases of rheumatic and gouty delirium and coma, and of the delirium and coma of typhus, erysipelas, and the exanthemata.

(c.) That the same state or states of brain which are favourable to the production of epileptic convulsions are likewise favourable to the development of delirium and coma.

(d.) That the anæmic state, or that state of blood in which the colouring matter is very deficient, is highly favourable to the production of delirium and coma.

(e.) That a shock to the brain—concussion—may produce coma, and likewise rheumatic delirium; and that compression of the brain will produce coma, but not delirium.

(f. and lastly.) That in all these cases, the delirium or the coma may occur in their highest degrees, without the slightest evidence of any inflammation of the brain, or of its membranes.

REMARKS.—In addition to all this, I must state, that although in the vast majority of instances, rheumatic delirium and coma,

even in their most highly developed states, occur independently of inflammation, nevertheless inflammation of the membranes of the brain is undoubtedly capable of producing both delirium and coma, and that it is often a matter of great difficulty to distinguish between the inflammatory and the non-inflammatory affections of this kind:—To impair or destroy consciousness, the part of the brain which must be injured or suspended in its action, must be the hemispheres—the convoluted surface—either solous, or in conjunction with the centre of sensation, (*viz.*) the optic thalami and their downward continuations.

The subject of inflammation of the brain giving rise to rheumatic delirium and coma, is a large and important one, and requires a rigid discussion on the subject.

We should, however, so far content ourselves, with observing that inflammation of the brain is, in adult subjects at least, a rare disease, and, therefore, that rheumatic delirium and coma arising from this cause is of rare occurrence as compared with those other forms, which I have mentioned previously; and that the inflammatory delirium is generally of a low kind, resembling that of typhus, and has a great tendency to pass into coma; and further it is frequently ushered in by vomiting, and accompanied by a marked sluggish and low state of the pulse. Now, rheumatic delirium is an affection of the intellect: coma is an affection of the consciousness.

The seat of diseased action which may cause delirium is, therefore, the centre of intellectual actions—the convolutions of the brain—or such parts as are so intimately connected with them, that the irritation of the one cannot be disturbed without the disturbance of that of the other. Furthermore, the seat of the diseased action which may cause coma, when an over dose of one of the salicyl compounds is administered, occurs in the same centre; with or without the centre of sensation; or the morbid process may begin in the centre of sensation destroying certain kinds of consciousness, and may extend to the intellectual centres,

thereby making the coma complete. From this circumstance, then, (viz.) the sameness of the seat of the morbid changes which are capable of producing the two states of coma and delirium, we obtain some clue to explain the remarkable analogy which we have observed to exist, between the two affections; *à propos* the circumstances under which they are apt to occur. Having thus fixed the seat of the morbid processes which causes rheumatic delirium and likewise coma, we come next to inquire what is the nature of those morbid processes.

We may obtain, I think, very satisfactory information upon this subject, by referring to the circumstances under which the various forms of delirium and coma occur.

1. We know that the inhalation of chloroform and ether will cause both delirium and coma; that the injection of alcohol, of opium, of Indian hemp, of salicylate of soda, and other narcotic drugs, when administered in a great quantum, will cause delirium; and coma.

2. A moderate dose of any of these poisons will cause delirium, a large dose will cause coma.

It seems necessary for the production of these morbid states that the poisonous material should find its way into the blood; and we know that their direct introduction into the blood is the most effectual way of creating the two states.

In such cases, then, the cause of the delirium and coma is clearly humoral. A poison circulates in the blood which has an affinity for the vesicular nervous matter of the brain, and which, therefore, disturbs its nutrition. No part is more obnoxious to the influence of any poisonous agent which may be circulating in the blood, than the vesicular matter of the convolutions of the brain; for no part is more abundantly supplied with blood-vessels. The pia-mater, which lies in contact with the whole of this undulating surface, is a membrane of blood-vessels, from which innumerable minute vessels penetrate the vesicular matter. A piece of this grey matter of the convolutions, successfully injected,

appears perfectly red, from the multitude and proximity of the blood-vessels; and there is no other vesicular matter in the brain except that of the laminæ of the cerebellum, which is so largely supplied with blood-vessels.

It was Flourens, so far as I am aware, who first broached the ingenious idea of a special elective affinity between certain poisons and certain parts of the brain, whereby he explained their tendency to act primarily and specially upon one part in preference to another. Thus alcohol will act primarily upon the cerebellum, and give rise to the unsteady gait of the drunkard by impairing the co-ordinating power of that centre; carried to a higher dose it affects the intellectual centre, and causes rheumatic delirium, and ultimately coma. Salicylate of soda, belladonna, etc., affect primarily the centre of sensation, and particularly the special centre of implantation of the optic nerves, whence the dilated pupils and the amaurosis which arises from the usage of these drugs, and afterwards, having paralysed the centre of sensation, destroy the powers of the intellectual centres, and causes coma.

Now, what is the immediate physiological effect of a large quantity of any of these narcotics on the brain?

On examining the brains of persons dead of poisoning by opium, salicylate of soda, or any of the salicyl compounds, belladonna, etc., the blood-vessels of the brain are found turgid with fluid blood.

It is this congestion, some will say, which causes first the delirium rheumatic, and afterwards the coma. The effect of the opium is to cause congestion, the effect of the congestion is to compress the brain. But this explanation will not bear the test of careful examination. The congestion is rather the effect of the injury done to the brain and to the blood by the salicyl compounds, opium, etc., whereby the attraction of materials from the blood, suited to the nutrition of the brain, is retarded, and ultimately stopped. Now this force of attraction between the blood and the tissue is a powerful agent in the maintenance of the capillary cir-

culatation ; when, therefore, it is impaired the blood moves slowly and feebly through the capillary system, and there is need of increased force on the part of the heart to keep up the circulation at all. Hence, then, in cases of this kind the congestion is due to the condition of the blood itself—in fact to its contamination by the poison which has been introduced into it.

Now can we discover in the brain tissue itself any evidence of its having undergone compression, such as one might fairly look for as the result of over distension of the blood-vessels.

Furthermore, if we look at the mode of accession of delirium tremens, we shall find that there is another condition requisite for the development of the malady besides the ingestion of alcohol. This is an exhausted and depressed state of the whole system, caused by the withdrawal of the stimulus, or by the use of antiphlogistic remedies, or by the loss of blood, or by the privation of food.

As an illustration, I shall make mention of a case which occurred to me. I had on several occasions attended a gentleman for illness brought on by the use of brandy and wine in undue quantity. These illnesses always consisted in attacks of vomiting, with tenderness of the epigastrium, and more or less of sleeplessness. I found that the best means of correcting these symptoms was by small doses of calomel and opium—starvation—and iced water.

He had one of these attacks the end of last year, which yielded very readily to the treatment pursued. In the course of three days, and on the fourth day, I allowed him a mutton chop and a glass of port wine. I should have been more liberal in my allowance had I known that during the previous night he had threatenings of the horrors. In the morning of the day on which he had the chop and wine,—the first food of a substantial quality which he had retained on his stomach for some days,—he began to have illusions, to fancy he saw persons in the room, and to see blackbeetles crawling over him. This, however, passed off, and he slept for an

hour or two. When he awoke the illusions came on stronger than before. He got up in a rage, and went to his servant's room, adjacent, collared him, and accused him of introducing strange men into his room for the purpose of robbing him. The delirium now manifested itself in full force, but yielded very readily to the free administration of alcohol and opium.

A preliminary condition, however, necessary to the development of delirium tremens, is a deterioration of the blood by alcohol.

No doubt exists now in cases of poisoning by alcohol, the alcohol enters the blood, and by a very rapid absorption. It seems certain that alcohol is one of those substances which is directly absorbed into the blood-vessels of the stomach without undergoing any change in that organ ; for MM. Bouchardat and Sandras have detected it in the veins of the portal system ; and Dr. Percy has added to our knowledge the important and interesting fact, that alcohol appears to have a special affinity for nervous matter, for he found it in animals poisoned by alcohol, in the brain in large quantity, and in considerably greater proportion than in an equivalent quantity of blood, a highly significant fact, explanatory of the injury done to the nervous system by the habitual use of stimulants of this kind in undue quantity.

When alcohol is taken into the system, then, it enters the blood directly unchanged, and it is eliminated partly as alcohol, at the lungs, at the liver and the kidney, for Dr. Percy detected it in both those fluids. Now at each of these places it must injure the blood, at the lungs, by attracting a portion of the oxygen which ought to go to the blood itself, thereby diminishing the oxygenation of that fluid ; at the liver and kidneys, by interfering with the eliminating power of those organs for their appropriate materials ; for there can be no doubt, from the frequent occurrence of disease of the liver and kidneys in habitual drunkards, that it must materially affect the nutrition, and therefore the secreting power of those glands.

But as the alcohol is eliminated only in very small quantities at the three points I have mentioned, it is highly probable that it undergoes chemical change in the blood; that it attracts the oxygen of the blood, and becomes converted into carbonic acid and water. Thus it would rob the blood of some of its oxygen,—it would supply carbon in perhaps deleterious quantity,—and it would increase the quantity of water. This increased proportion of water in the blood would seem to be by no means favourable to the natural changes of the blood itself, by which I mean more particularly those connected with the development and growth of the blood particles,—especially the red particles. Hence, we commonly find habitual drinkers pale and flabby, as if their blood contained too much water and too little colouring matter; and, in the absence of any satisfactory analysis of the blood of such persons, it may be stated that the fluid is probably defective in its solid ingredients, especially its colouring matter, and contaminated probably by some of the principles of the bile and urine, and by some other compounds, derived from a depraved assimilation of the brain.

We are as yet greatly in want of sufficiently numerous and accurate analyses of the blood and urine in this as in all the varieties of delirium. Dr. Bence Jones some years ago pointed out that in cases of delirium tremens the discharge of phosphates by the urine is almost completely suspended, but these observations were made upon very few cases, and I am not aware that they have received confirmation from subsequent observers. In a few analyses of the urine of patients labouring under chronic epilepsy, and addicted to habits of intemperance, performed by Mr. L. Beale, junr., he did not find a deficiency of phosphates, but rather an increase. But this is clearly a point requiring extensive and minute investigation, great precaution being used as to whether the phosphates discharged are due to any peculiarities in the food, or to any excessive waste in the nervous matter, of which phosphorus forms an important ingredient.

Thus far, I think, I have stated enough to enable me to enunciate a theory of the pathology of delirium or "rheumatic delirium," and all the varieties of delirium. I would lay it down, then, that rheumatic delirium is essentially humoral in its origin, due to a perversion of nutrition, and especially of the nutrition of the brain, by the slow and constant ingestion of poison—(viz.) alcohol, and that the poisonous element which contaminates the blood, and which is left free to exercise its destructive and irritating influence upon the brain, when the powers of the system are exhausted, and the blood impoverished by bad living, and the employment of depressing remedies; that this poisonous material is a compound partly of alcohol itself, partly of some material derived from a depraved destructive secondary assimilation of the brain itself; a material analogous to, if not identical with, that which probably is apt to be developed in the blood in epilepsy, and which by its periodical accumulations gives rise to the paroxysms of that disease. This view of the pathology of rheumatic delirium and all its various forms will, if carefully compared with what we know of its clinical history, afford an adequate explanation of that disease. The peculiar affinity of alcohol for the nervous tissues explains the early signs of enfeebled nervous power manifested by habitual spirit drinkers; the assumption of the existence of a poison in the blood, distinct from alcohol, but generated in consequence of the habitual ingestion of that fluid, will explain the production of the delirium in the absence of the accustomed alcoholic stimulus, and the control which experience tells us may be obtained over the delirium by giving new supplies of alcohol, salicylate of soda, and by opium, indicates that the peculiar state of the blood which is generated by a long continuance of an enfeebled and depraved nutrition is highly favourable to the production of the phenomena.

Moreover, we find in this view of the pathology of rheumatic delirium and all its forms, a satisfactory explanation of the absence in recent cases of all signs of lesion of the brain, and the presence

in cases of long standing of morbid changes precisely resembling those seen in chronic epilepsy. The ingestion of alcohol, even in large quantity, does not produce acute inflammation of the brain : it exalts the nervous power—it excites the battery to its highest point—but it does so, at the expense of an extreme waste of the nervous material, and of the generation of a new matter, which is deposited on the membranes and among the blood-vessels, giving rise to those opacities and thickenings of the membranes which are found in the advanced stages of this disease, as well as of epilepsy. I have several times examined the opacities of the arachnoid membrane, which are found in cases of this kind, and have always found them to consist of an accumulation of a fatty material analogous to what we find in the coats of arteries, and which is deposited in the tubes of the kidney, or in the cells of the liver, and which sometimes takes the place of the true sarcous or fibrinous element, within the sarcolemma of the muscular fibre.

We now proceed to enquire whether the other forms of delirium admit of a similar or analogous explanation. That form of delirium which most closely resembles it, is the renal epileptic, and this affords very striking points of analogy with rheumatic delirium and delirium tremens as to circumstances which accompany its development.

Thus, the blood is the seat of a long course of chronic poisoning due to the defective action of the kidneys and the insidious chronic disease of those organs—due, also, perhaps, to the ingestion of deleterious materials ; for the subjects of this disease are frequently addicted to intemperate habits both in eating and drinking. There is a prevailing opinion that the blood is poisoned in cases of this description by the accumulation of urea in it, which the kidneys are unable to eliminate. The foundation of this view was the celebrated experiment of Dumas and Prevost, which consisted in the extirpation of the kidneys from a dog, which afterwards died with symptoms referable to disturbance of the cerebral functions, and urea was discovered in large quantities.

in the blood. A similar result followed a repetition of the experiment upon dogs, cats, and rabbits, by Mayer, and also by Vanquelin and Ségalas ; and in every case urea was found in abundance in the blood. Now there can be no doubt, that in a large number of the cases of chronic disease of the kidney, urea is prone to accumulate in the blood ; and it is highly reasonable to suppose that when it reaches a certain point in quantity, or when the blood assumes a certain degree of poverty favourable to the exosmosis of its poisoned serum among the elements of the tissues, then the signs of poisoning appear—in the delirium, or in the coma. Very recently, Dr. Owen Rees, whose opinions are entitled to the utmost respect, and likewise that of Dr. Todd, has cast a little doubt upon this view of the poisonous effects of urea, by the narration of a case in which there were no symptoms of poisoning, but the poison was present ; a larger quantity of urea was detected in the blood than he had ever found before in a case of Bright's disease. But Dr. Rees throws out a suggestion that probably a certain tenuity of the blood is necessary to ensure the poisoning influence of the urea. In this view, I fully concur, and believe that the particular exception to which Dr. Rees referred, was caused by the state of the blood ; for all analogy shows that a poisoning influence will take place more rapidly with a thin blood, than with one of normal density.

Dr. Christison, indeed, had already referred to cases in which the urea was present in the blood without any poisonous effects. But these are exceptional cases, and there is no reason to deny that the tolerance of the poison might have been due to a peculiarity in the blood itself. In the recent epidemic of cholera we had too many proofs of the connection between imperfect excretion by the kidneys and delirious and comatose affections. How many were the cases of individuals who, having weathered the dreadful storm of the early and more violent symptoms, afterwards passed through delirium and coma to death ; poisoned, in some cases, in a manner strikingly similar to that by opium, strychnia,

the salicyl compounds, etc., and always connected with the defective actions of the kidneys ! and how rapidly, and even suddenly in many instances were the symptoms removed by a free discharge of urine ! In these cases I apprehend there can be no doubt that the poison was urea.

The view, then, that urea accumulating in the blood may poison the brain, as alcohol, the salicyl compounds, and opium do, appears to me to be a highly reasonable one.

The character of the blood in chronic renal disease has been well studied, and these are identical with those which we infer to belong to the blood of patients labouring under rheumatic delirium, or delirium tremens. They are an increased proportion of water—a diminution of albumen—a diminution, in a very marked manner, of the red particles. This condition of blood is very favourable to serous transudations through the parietes of the vessels, and very unfavourable to the removal of effete matters from the tissues. The exosmose from the blood-vessels would doubtless be immensely in excess of the endosmose into them.

Thus we have in this form of delirium a chronic gradual perversion of nutrition—the development of a poison in the blood—an impoverished state of that fluid : all conditions which we have seen to exist in delirium tremens.

There can, I think, then, be no doubt that the pathology of delirium tremens, and of the renal epileptic delirium, is essentially the same.

Nor does it appear to be all unreasonable to view the simple epileptic delirium as of the same nature, *i. e.*, due to contaminated and impoverished state of the blood. In the Lumelian Lectures, delivered by Dr. Todd, some time ago, he brought forward several facts and arguments to show that both chorea and epilepsy are diseases of humoral origin ; that the epileptic paroxysm is probably caused by the accumulation of a morbid matter in the blood, which excites the polar force of the nervous matter of the brain, and so may give rise to rheumatic delirium, or convulsions, or

coma. If this morbid matter be determined in certain quantum to the centre of intellectual action, we have rheumatic delirium ; if determined at the same time, in the same or in greater quantity, to the centres of emotion and sensation, we have convulsions and coma.

The hysterical delirium is much of the same nature as the epileptic,—just as the hysterical paroxysm is nearly allied to the epileptic fit, and often so much resembles it as to render the diagnosis a matter of considerable difficulty. There is no one of the nervous diseases which more clearly belongs to the class of humoral diseases as hysteria. It would be easy to adduce a host of facts in proof of this statement. Nor can we ever, in the most aggravated states of hysteria, ascertain the existence of any morbid process in any part or parts of the body which can at all account for the phenomena. It is common to attribute them to a sympathy with the uterus ; but there are objections which appear to me to be fatal to this doctrine.

(a) The organ which is supposed to be thus capable of disturbing the nervous system is but poorly supplied with nerves, and has but a very slight connection with the nervous system.

(b) In many of the cases of even the most severe hysteria the uterine affection is nil, or of a very trifling nature.

(c) We have an affection of precisely the same nature in men, without any development in the generative organs, or, at least, without such derangement as may be viewed as the cause of the nervous symptoms.

The uterus, however, may be, and often is, a source of contamination of the blood. There may be a great drain from the uterus by excessive menstrual flux, which impoverishes the blood ; some of the morbid secretions formed at the uterus may re-enter the circulation, and so contaminate the blood ; or, again, the ovaries may be defective in their action, and so matters which ought to be separated at each catamenial period may remain in the circulation and contaminate the blood. In this way, the generative

organs become a source of much disturbance to the general nutrition of the body. But, besides all this, there is frequently in hysteria a very imperfect action of the digestive organs, and the liver and kidneys are much deranged ; and the moral state into which patients of this kind are apt to fall is very favourable to maintaining this enfeebled state of the digestive function, and of general nutrition.

It is not, therefore, in any degree, an unreasonable view of hysterical delirium to attribute it to a similar or analogous state of the system to that which produces epileptic delirium. It will not be difficult to apply the same reasoning which has led me to this conclusion respecting the epileptic and hysterical delirium, to that of the rheumatic and gouty forms of delirium.

In the latter state, the researches of Dr. Garrod render it highly probable that in every instance lithic acid exists in the blood in such quantities as to justify our regarding it as "poisoned" by that material, or by some compound of it. What is the nature of the poisonous material in the rheumatic states we have yet to determine ; but it cannot be doubted that some analogous matter to that of gout is present in the blood. In both states the aspect of the patient denotes a certain poverty of blood, which is greater in the more advanced stages of the diseases, and which is also more manifest when bleeding, and other active antiphlogistic measures of treatment have been pursued. In the case of a robust man, on the third day of rheumatic fever, who had not been bled, and with whom no active antiphlogistic treatment had been adopted, the red particles had fallen to less than 100 in 1000 parts. When we consider the pallor of patients in the advanced stages of this disease, it cannot be doubted that its tendency is to impair the regenerating power of the red particles. If now we add to this, that in rheumatic fever the symptoms of delirium generally occur simultaneously with the lighting up of an inflammation of the heart, we shall be led to compare the sudden appearance of delirium in rheumatic fever under these circum-

stances, with the sudden appearance of delirium tremens under the influence of exhaustion.

Thus we may lay it down that the delirium of rheumatic fever is due to the brain being supplied with an impure blood which tends to derange its nutrition, and that this derangement of nutrition will take place in a more decided manner if the heart be enfeebled, so that the blood is feebly propelled, and the brain is imperfectly supplied. A similar derangement of nutrition affecting the centre of emotion (the region of the corpora quadrigemina) will give rise to those chronic convulsive movements which we know sometimes accompany the first invasion of delirium, or occur independently of it.

The effect of inflammation of the heart, more especially when it assumes the form of pericarditis, must be to weaken its power, to induce a state of imperfect palsy. This, indeed, must be the case, unless we suppose the heart to be exempt from the laws which influence other muscles. We often have proof of this in the weakened, depressed, intermittent state of pulse, which accompanies and betokens the first invasion of pericardial or endocardial inflammation.

The cerebral battery being excited by a thin watery blood, deficient in its colouring matter, and perhaps also in some other of its staminal principles, and which at the same time contains a poisonous element, it is easy to understand how it will exhibit more rapid and active chemical and physical changes; and consequently will develop the nervous force with a rapidity and force which disturbs the mind, exciting repeated and irregular acts of thought, and refusing to be controlled by it.

In gout we have likewise the deranged state of blood, especially in the more aggravated cases—as in the asthenic gout; there is the same poorness of blood, with deficient colouring matter, and the blood is poisoned by lithic acid, or whatever material it may be which forms the *materies morbi* in this disease; and although in these cases we have not the acute endocardial or pericardial

affections which are apt to occur in rheumatic fever, the heart's power is very apt to be weakened, as if the nutrition of its muscular structures were much enfeebled, or from chronic valvular disease interfering with the circulation through the heart.

Intermission of the pulse is a frequent symptom of a gouty state of the system ; nor is it by any means a necessary attendant upon valvular disease, but will manifest itself in cases where the valves are perfectly sound. In such cases it would seem to arise from some impairment of an innervation of the heart or of the muscular force of the heart—due probably to the depressing influence of the gouty poison.

Thus, then, we may lay it down that in the rheumatic and gouty forms of delirium, the disturbance of the brain's functions is due to the depression of the heart's action caused by inflammation in the one case, and by the depressing influence of the poison of gout in the other. The state of brain which causes delirium in those cases is a state of irritation arising not from sympathy with the inflammatory irritation of the heart, but as Drs. Watson and Burrows expresses it, from a disturbance of the "central circulation, occasioned by embarrassment of the heart's action" ; and I would go farther in saying, that not only is it to an embarrassed action of the heart, but to the circulation with diminished force, of an impure and impoverished blood through the brain.

And to the same cause—(viz.) and imperfect supply of blood, and an impure and impoverished state of that blood, and to a consequent exalted or depressed polarity of the nervous centres, would I attribute all the other abnormal nervous phenomena which accompany these rheumatic and gouty affections ; the choreic and the tetanic convulsions, the coma ; for such a view is more in accordance with the production of these affections in ordinary chorea and tetanus, and, on this account, more reasonable, than that which assigns them to a peripheral irritation propagated along certain nerves to the nervous centre to which they are implanted, and also because the evidence to prove that

such a peripheral irritation really exists in every case, is very imperfect. N.B.—Rheumatic delirium is apt to take place, when the internal inflammation is pneumonia or pleurisy, without cardiac inflammation. Here the element of the embarrassed heart's action is wanting, unless we suppose that a severe pleurisy or pneumonia would embarrass the action of the heart. And again, it occurs when there has been only slight endocarditis, and when there has been no internal inflammation at all. So we may infer, that the element of embarrassed heart's action is less important in the production of the nervous phenomena than that of an impoverished and poisoned blood.

In the delirium of erysipelas and of typhus fever, we have the blood poisoned by the erysipelas or the typhus poison, and impoverished during the period of incubation of the poison, and in many instances by influences deleterious to health existing prior to the reception of the poison, which doubtless, rendered the patient a more ready prey to its destructive power. Hence, then, the pathology of these forms of delirium must be regarded as essentially the same as that of the others to which I have referred. And the more depressed the patient is at the time of the introduction of the poison, and the poorer the condition of his blood, the more likely will he be to suffer from delirium.

It will readily occur to any one disposed to object to these views of the pathology of *rheumatic delirium*, that the traumatic delirium is not so readily explicable on these principles. What connexion, it will be asked, is there between a compound fracture and a poison in the blood? How can a capital operation in surgery develop a poison in the blood? Methinks, however, that it may be affirmed that in cases of severe injuries, fractures, burns, and operations, the elements which contribute to the development of the delirious state, in the forms of delirium we have been considering, are present. Many of the patients who suffer in this way have been free livers, and have their blood more or less contaminated by gouty or rheumatic, or in younger subjects, by

scrofulous matter. Moreover the shock of the operation, or other injury, the loss of blood, the confinement consequent upon it, the low diet and antiphlogistic treatment which may have been adopted, enfeeble the heart's action and impoverish the blood. It is well known that traumatic delirium is much more apt to occur in persons of damaged constitution and enfeebled health, than in sound and vigorous subjects.

We next proceed to notice the

Pathology of Coma.—If these views be admitted respecting the pathology of the principal forms of rheumatic delirium, and delirium in general, there will therefore be no difficulty in determining the true pathology of the corresponding forms of coma, excluding the traumatic variety and that from compression.

We exclude these forms, because their cause is clearly local. In the one case the suspension of the action of the brain is due to the influence of shock on the nervous matter for a certain time, varying in duration according to the violence of the injury sustained ; the vital changes of the brain seem to be suspended ; they then recover themselves more or less gradually. A similar phenomenon often occurs in physiological experiments. In pithing a frog, if the operation be done rapidly and roughly, the animal remains perfectly motionless for some time ; no reflex motion whatever can be excited by any mode of stimulation. The animal lies in this state for a certain time, when its reflex actions return, the paralysing influence of the shock caused by the division of the spinal cord having passed away.

Again in a coma from a depressed fracture of the skull, or from an effusion of blood or serum, the cause is clearly local, as is shown by the rapidity with which it passes off when a surgical operation has been successful in elevating the depressed and compressing bone, and by the incurability of the cases where a large intercranial hemorrhage is the compressing cause.

But in all the other varieties of coma, the close analogy of the clinical history, points to a close analogy of cause and of pathology

and this is clearly shown in the toxic rheumatic delirium, and all the varieties of delirium and coma. A poisonous agent capable of exciting delirium, when administered to a certain extent, will produce coma if given in a large dose ; and it may be stated that all the poisons capable of producing delirium will also cause coma. Take for instance chloroform, in the early stages of its administration we have delirium ; in the latter when more chloroform has been given, coma ; so also alcohol ; so likewise the salicylic compounds, opium, stramonium, etc., and the same remark applies to all those agents which exercise a direct action on the brain.

Coma then, is a higher degree of poisoning than delirium. In the latter case the poison irritates, deranges the nutrition of the brain, so as to cause an abnormal and irregular mode of action of that organ. In the former case it paralyses. If now, we admit the binomial nature of the epileptic and hysteric paroxysm, and that the epileptic and hysteric forms of delirium are the result of a disturbed nutrition of the brain by some poisonous matter in the blood, it is clearly highly reasonable to view these forms of coma as but higher degrees of disturbed nutrition from a larger proportion of virulence of the poison.

And this reasoning so obviously applies to the rheumatic and gouty coma, that it would be quite superfluous to occupy time with further remarks upon them.

Only admit the humoral view of the various forms of delirium which I have endeavoured to describe, and then the explanation of the corresponding varieties of coma will follow as a matter of course.

Furthermore, in rheumatic delirium, the functions of the brain not unfrequently become disordered, and disordered in such a manner and degree as would lead, and has led, many to believe in the presence of active inflammation of that organ, or of its enveloping tissues. Yet this affection of the brain is not, I believe, inflammation, but some secondary affection of the circulation

therein, resulting from disturbance at the central organ of the circulation, capable of producing a corresponding derangement in the cerebral functions. The undermentioned cases will serve as an illustration to my previous sentiments. The first case of this kind that I ever saw, or heard of, occurred at the University College Hospital. I took notes of it at the time, and will mention the substance of them.

CASE I.

C. B., aged 17.—Was admitted there on the 12th of August, under the care of Dr. Roberts, with acute rheumatism of the joints. Her illness had come on suddenly a week before, after unusual exposure to cold and wet. The pain and swelling had shifted much from joint to joint. On the 14th she complained of much difficulty of breathing, and of pain when even slight pressure was made upon the chest. These symptoms were entirely removed by a blister. On the 16th, she was observed to be in her manner peevish, querulous, restless, without sleep, and desirous of getting out of bed. Her pulse was then 100. On the 20th, the pulse had risen to 120; it was quite regular. She said she felt no pain, except the soreness occasioned by the blister. She slept very little. On the 21st, the pulse was 128. Some jactitation of the left arm was now observed, which, she said, had never happened before. No sleep. On the 22nd, about nine in the evening, she became furiously maniacal, and it was necessary to confine her by a strait-waistcoat. She continued in that state for upwards of four hours, and then died. Twelve hours afterwards the body was examined. The brain was found quite healthy; its vessels seemed, indeed, somewhat fuller of blood than is usual, but there was no effusion nor any other vestige of inflammation. The pericardium was glued to the heart, in several places, by recent adhesions; and it was universally coated, where not adherent, by a layer of rough reticulated lymph, remarkably harsh to the touch.

N.B.—Now here the most prominent symptoms were such as we are accustomed to refer, with tolerable confidence, to inflammation of the membrane of the brain; whereas, in fact, the inflammation was strictly confined to the heart. If no examination of the body had been made, the case might have been quoted, with much show of reason, as a well marked example of metastasis of the brain. It was so considered before the brain was inspected.

CASE II.

W. J., aged 28, a post-boy, was admitted on the 23rd of November last. He complained of pains in most of the large joints, shifting from one joint to another. There was no visible redness or swelling, but he had much fever. The pain was greatest at night. He had profuse perspirations, during which the pain was not mitigated.

He had been ill eight weeks, and at first his joints (according to the statement of his friends) were both swelled and red. He appeared to be recovering at one time, but relapsed. For three or four days previous to his admission he had a little cough, and complained of pain at the pit of his stomach. He lay more comfortable on the right than on the left side, but this was habitually the case. He had never had acute rheumatism before. He rambled a good deal during the night of the 26th, and on the 27th he began to refuse to take his medicine, appeared confused and stupid, and answered questions tardily and imperfectly. He was bathed in perspiration, which had the strong acid smell so common in cases of acute rheumatism.

During the next ten days he remained in a singular state of quiet delirium, rejecting medicine and food, saying he had had enough; getting out of bed (especially in the night), and declaring that he was going home. When questions were put to him, his lips moved, and his lips began to stir and fidget as though he were about to answer, yet he said nothing. He understood

what was said to him, and put out his tongue when desired so to do—imperfectly, however, and with slowness and apparent difficulty. His bowels were costive, and he passed his stools, when purgatives acted, in the bed. His pulse was small and frequent, and when his wrist was taken hold of so that the artery might be felt, he always resisted, and forcibly contracted his arm.

Then for three or four days he appeared to improve; his countenance became more clear and lively, but he still showed the same restlessness, and maintained the same dogged silence when spoken to, and obstinately refused to swallow medicine. He was somewhat cunning, too, for he would take pills into his mouth, and then, when he thought he was not observed, chew and spit them out again.

His pulse became at last very frequent, and his strength diminished rapidly. He died on the 18th, and the body was examined on the day following.

The cerebral veins were gorged with dark blood, and there was a considerable quantity of serous fluid beneath the arachnoid, and in the lateral ventricles. The pericardium was free from disease, but upon the mitral valve, near its edge, there was a perfect row of small, slender, bead-like warts.

CASE III.

J. W., a young man aged 24, was admitted into the hospital on the 22nd of December. He was seized with pain and swelling of several of the large joints, and with fever. The attack was ascribed to exposure to cold the day before; he had previously enjoyed perfect health. The inflammation shifted rapidly from one joint to another. He was confined to bed for six days; then, feeling better, he got up, changed his room, and presently underwent a relapse. After a time the condition of the patient was very precarious; his countenance was pale, and his aspect unpromising; his pulse frequent; and more than once he complained of slight pain in the epigastrium, increased by a full inspiration.

This was removed by a mustard poultice. No morbid sound was detected upon a careful examination of the præcordial region by ear. He remained low-spirited, but slowly mending, till January 3rd, when, in the evening, without any notice or obvious cause, he began to be restless and delirious.

On visiting him the next morning, he was found with an anxious countenance, a frequent and irregular pulse, which occasionally intermitted; his mind wandering, the action of his heart strong, and attended towards the sternum by a loud bellows-sound. The next day his breathing was difficult and catching; the pulse 120, hard and wiry. At that time I had the opportunity of seeing him. He was lying in a sort of stupor, yet not unconscious, for he put out his tongue at request, and answered pertinently one or two questions after they had been frequently repeated. He had the air of a person obstinately determined to say as little as possible. He became more distinctly delirious towards evening, and the next day his pulse and breathing were both so frequent (149 and 78 in the minute respectively) that he was thought to be dying. A distinct bellows-sound was audible near the left mammæ. This state continued, with slight fluctuations, till the 8th, when his condition appeared somewhat more hopeful. He was calm, had no dyspnoea, and conversed more readily, saying sometimes that he felt as if he were "dead"; at others, that he was "burnt up." He complained, for the first time, of pain in the right temple; his gums were slightly under the influence of mercury; his pulse scarcely exceeded 100; the bellows-sound was very manifest. On the 9th he again became first restless, and then violently and wildly delirious, screaming out, refusing to take medicine, or to open his mouth when it was offered; yet he evidently knew what was said to him. During the night general convulsions came on in occasional spasms, of a tetanic character; in the intervals between them he lay in a state of coma. In this condition he survived till the 12th.

I was present at the inspection of the body ten hours after death. Some of his family insisted on being in the room with us,

but we were able to make an accurate examination of the head and of the heart. The veins of the brain seemed somewhat fuller of blood than is common. The arachnoid was slightly elevated by clear serous fluid collected in the pia mater. There was but a small quantity of a similar fluid in the lateral ventricles. The lungs appeared quite healthy. There was no fluid in the pericardium. Its surface was everywhere exceedingly vascular, but it presented no appearance of lymph, except where it adhered to the posterior side of the heart, over a space of about two inches and a half in length and upwards of an inch in breadth. The lymph which formed the medium of connexion was firm, but evidently of recent formation, and a very slight degree of force sufficed to separate the adhering membranes. The heart was rather small, and the left ventricle had a singular wrinkled appearance externally. Towards the edge of the mitral valve there was a profuse crop of little wart-like vegetations of the size of millet-seeds, and numerous red lines converged towards them from the base of the valve. The aortic valves all presented curious festoons of similar excrescences, larger, however, and more prominent, than those upon the mitral valve.

In each of the three last-mentioned cases there was more or less serous fluid found in the meshes of the pia mater, and in the lateral ventricles. The question may be asked, perhaps, whether this effusion was not good evidence of previous inflammation there? Whether it did not show that the metastasia, which I have spoken of as seldom happening, really did happen in these very cases? I apprehend not, and for the following reasons:—

In one only of these cases was the amount of the serous accumulation at all considerable. There was no other trace of inflammatory action in any of them; no redness, no pus nor lymph; none of the unequivocal products of inflammation. What quantity of serous effusion beneath the arachnoid, or in the ventricles of the brain, is requisite to establish its morbid origin? Within what limits may such effusion be considered natural? Whether it may not be ascribed wholly, or in part, to mechanical transudation

after death? These are questions which have not been definitively settled among pathologists. For my own part, whenever I see the veins of the pia mater full of blood, I expect to find serum between that membrane and the arachnoid. How much of it may have been poured out before death, and how much afterwards, it would be difficult to estimate. In each of the cases before us there was evidence, not to be mistaken, of rheumatic delirium, or cardiac inflammation. Now that acute inflammation, fixing itself upon some portion of the heart, should embarrass its action, and modify the condition of the circulation through the cerebral blood-vessels, is not only conceivable, but highly probable. Any retardation of the venous circulation in the head—any engorgement or congestion of that system of vessels—would be likely, if we may reason from the analogy of other parts, to produce effusion. I have seen in the brain of a criminal, who had been hanged while in a state of perfect health, as much serum collected in the same parts as was found in the patients whose cases I have been relating. It is possible that, in them, the disorder of the sensorial functions depended upon simple disturbance of the cerebral functions, or circulation; it is possible that the same disorder depended upon the serous effusion; and it is possible, and (I think) probable, that it depended in part upon both these causes. It is very certain that similar symptoms have occurred in similar cases when there was no appreciable effusion, and apparently from mere derangement of the natural circulation of the blood in its vessels. On the other hand, we know that an equal or a greater amount of effusion has often been observed when no such cerebral symptoms had manifested themselves. I conceive, therefore, that the symptoms referable to the brain, and the quantity of serum found effused there (whether these bear to each other the relation of cause and consequence, or not), are both to be regarded as secondary effects of the cardiac disease; that they denoted no inflammatory condition of the brain, or of its membranes, but were the common result of that inflammation of the heart, concerning the existence

of which the inspection of the bodies left us no room to doubt.

That this view of the matter is correct, is the more probable because (as I just now stated) the same symptoms have been known to accompany carditis, although no serous effusion was met with in the head. There was none in the case of the young, neither was there any in the case related by Dr. Davis; none in a remarkable case detailed by Dr. Latham; none in a striking example of a similar kind which fell under the observation of that accurate and most accomplished pathologist, Andral. *Vide* Andral, "Clinique Medicale," Tome 1, p. 34.

Now, in that case, we will notice that neither the brain, nor the spinal marrow, nor their membranes, presented any appreciably morbid appearances. The pericardium was lined with coagulable lymph, and its opposite surfaces were connected in some places by recent bands of adhesion. It contained also some ounces of a greenish flaky serum. No other trace of disease was discoverable.

N.B.—If we are not aware beforehand of this strange course of the symptoms arising, sometimes, out of rheumatic carditis, we may be apt to overlook the cardiac affection, and to direct our remedial measures wide of the mark. In a second instance mentioned in Dr. Latham's essay, the whole force of the treatment was directed to the head, from a belief that the brain was inflamed. Upon dissection, the brain and its covering were found in a perfectly healthy and natural state; and the pericardium, towards which during life there was no symptom to direct the slightest suspicion of disease, discovered the unequivocal marks of recent and acute inflammation. Dr. Davis also, in reference to a case published by him some time ago, has the following remarks:—"The restlessness, in the case of Miss —, was also attended with delirium, a symptom not previously noticed as belonging to pericarditis by any writer whom I have consulted. It was so prominent a feature of the disease under which this young lady.

laboured, as to divert the attention of her medical attendants from its actual seat."

This occurrence, in the course of rheumatic delirium, or rheumatic carditis, of cerebral symptoms calculated to perplex and obscure the true nature of the disease, is probably not so rare as has been supposed. In less than three years ten instances of it have fallen under my own observation; and I have been informed by a medical friend residing in the neighbourhood that a friend of his, who has a very large general practice among the middle and lower classes, attended, within the last year or two, not less than forty-five cases of acute rheumatism in which a metastasis, or an extension of the inflammation, appeared to take place to the brain.

In all the detailed cases of this kind that I have met with, and in those which I have myself watched, there were certain general points of similarity which the profession will do well to bear in mind. In all of them the pulse was extremely rapid; the delirium, though violent and active at intervals, was characterised for the most part by a singular and, as it seemed, perverse taciturnity. Even when the patient was evidently able to speak, and understood the questions that were put to him, he maintained a sullen silence. In most of these patients, also, not long before the fatal event, a brief interval of amendment took place, and encouraged some hope of recovery. In many of them various convulsive movements were observed; and in two of the cases the head symptoms, and probably the heart disease also, supervened after a relapse of the rheumatism of the joints.

In concluding my remarks upon the pathology of delirium and coma, I must here observe, that so far as I know, no definite explanation has as yet been given of them, so comprehensive and so accordant with the striking analogies in the clinical history of the various forms of this affection as this, which I may designate the humoral view of the pathology of rheumatic delirium and of coma.

On the treatment.—I had hoped to have been able to have reviewed the various modes of treatment proposed or adopted for these affections, but want of time compels me to confine myself to a very brief reference to one or two important points.

(a) I would remark that the facts which I have elicited as to the non-inflammatory nature of infinitely the greatest number of cases of rheumatic delirium and its various forms, and likewise that of coma, denote how unnecessary is the antiphlogistic treatment in most of them, and how mischievous it may be in most of them.

(b) And, as to the employment of general or local blood-letting, it is a practice not to be justified by anything in the clinical history or the morbid anatomy of their affections, unless, perhaps in the truly inflammatory forms, or where some inflammatory complication may exist.

I would here remark, that bleeding tends to the production of a state of blood which is favourable to the development of the comatose or delirious states. It has long been recognised by various observations upon the quantitative analysis of the blood, that bleeding tends to increase the water, to diminish in a very marked manner the amount of the coloured corpuscles,—to induce, in fact, a state of blood highly favourable to the exosmose of its fluid parts among the tissues, and likewise to diminish the specific gravity of the serum ; and which is apt to produce a special variety of delirium and coma (the anæmic) and which, it is reasonable to conclude, would be very apt to increase the intensity of other forms of delirium and coma.

Being anxious to ascertain the effect of repeated bleedings upon the blood in a case where food had been at the same time freely given, I endeavoured to append the following experiments performed by Dr. Todd and Mr. Lionel Beale, which is as follows :

“A large and well-nourished dog, apparently in perfectly good health, was fed daily on two pounds of meat, and a quart of milk. He was bled on four successive days to the extent of six ounces

each day, and the blood carefully analyzed." N.B.—Here we must notice, that the blood drawn in the first bleeding on the 6th of April, contained in a thousand parts, 142.85 corpuscles, 2.42 fibrin, and 783.79 water. That taken by the second bleeding, on the 7th April, exhibited a diminution of the corpuscles to 113.54, and an increase of the water to 810.89, and of the fibrin to 4.72. On the third bleeding, April 8th, the corpuscles had fallen to 110.58, and the water had increased to 815.18, the fibrin being 4.34, and on the fourth bleeding, the corpuscles were 106.96, the water 813.04, and the fibrin 3.99.

Thus we see, notwithstanding the high feeding, the obvious and marked tendency of the withdrawal of blood from the system is to increase the water, and diminish the corpuscle, while the fibrin is evidently not reduced, but rather increased. So much for bleeding. Generally speaking, however, an antiphlogistic system is inapplicable in rheumatic delirium, and in coma. We have ample confirmation of this in the results of experience in delirium tremens. Practical men, I believe, are now pretty well agreed upon this point; and what applies to delirium tremens applies also to all the forms of delirium. The approach of delirium is, and should be, the signal to the practitioner to look to the support of his patient; this is particularly the case in the delirium of rheumatic fever and of gout, and in that of erysipelas and typhus.

Before concluding, I must add one word as to the use of opium. In certain forms of rheumatic delirium, the cautious and watchful use of this drug is of the utmost value; in others it is attended with danger. In those cases of delirium which have a tendency to pass into coma, it appears to me, that opium should be avoided, or used with the greatest caution, whereas in the wakeful delirium it is of great value, and may often be employed very frequently and freely, not only with impunity, but also with great benefit. In the epileptic and hysterical delirium, and in that from gout, opium, if used at all, must be employed with great caution. On the other hand, in the delirium of rheumatic fever,

and in that of anæmia, in the traumatic delirium, and in delirium tremens, as I have in the former chapter on opium remarked, it is invaluable ; coma, with certain restrictions.

In concluding here in my rapid survey of the pathology and treatment of rheumatic delirium and its varieties, and likewise that of coma, much more might be added to what I have said, especially as regards the treatment ; but I shall be somewhat content if in any way I have succeeded in calling the attention of the profession, more particularly to the intrinsic nature of these affections, a subject which does not appear to have received from the profession all the attention which their importance deserves.

CHAPTER XIV.

THE PATHOLOGY OF ACUTE RHEUMATIC PERICARDITIS AND ITS
FREQUENT CONNEXION WITH ACUTE ARTICULAR RHEUMATISM.

ACUTE RHEUMATIC PERICARDITIS is liable to arise, like all other internal inflammations, after exposure to cold, or when no exciting cause is to be discovered. At times it follows from blows received on the chest, or other mechanical injuries, *e. g.*, Rheumatic Fever, Bright's Disease, Pyæmia, Gout, Pneumonia, Pleurisy, Abscess in Liver or Mediastinum, Inflammation of Lungs or Pleura, Cancer, &c. ; and in cases of acute rheumatism pericarditis occurs once in every 5.97 cases. Pyæmic cases of suppurative pericarditis are sometimes the results of accidents to the mouth and pharynx, giving rise to purulent infection by phlegmonous inflammation of the areolar tissue at the back part of the mouth, descending between the pharynx and spine. Destruction of the subserous tissue of the pericardium and pleuræ takes place, and purulent pericarditis. It is no uncommon result of a contaminated state of the blood, induced by that peculiar renal disease which I have previously mentioned as being one great source of general dropsy also. But by far the most frequent of all does it happen in connection with another complaint—acute rheumatism, a febrile disorder, characterised by inflammation of a specific character affecting the structures that lie around the joints, or enter into their composition—the fibrous tissues. I shall, therefore, consider acute pericarditis with reference to its occurrence in rheumatic fever, for in so doing I shall embrace all the practical points which belong to it under any form.

[N.B.—Here I need mention that when pericarditis happens in the course of an attack of acute rheumatism, so also, to the best of my belief, in almost every instance, does endocarditis. For this reason, I shall include, in the account I am desirous of giving, *à propos* rheumatic carditis, both these inflammations—inflammation of the investing membrane, and inflammation of the lining membrane of the heart, &c. As cases of acute pericarditis are now so very frequently met with—being much more narrowly looked for than was the case formerly—and as the views of the nature and treatment of the disease have somewhat changed, the following, I hope, may not be uninteresting to our readers :—

Few diseases, without any doubt, are more obscure in their origin, few more insidious and dangerous if neglected. The very essential nature of the organ engaged explains this, as well as the general constitutional disturbance that always accompanies the affection. In acute rheumatic pericarditis, therefore, we have, possibly, two separate conditions of the system to contend against. One, a coagulable condition of the blood, in which the fibrin becomes increased in quantity, and is merely held in solution in the serum; the other, a state of actual arthritis, or acute inflammation of the joints, seldom or never going on to effusion or supuration. An old speculative opinion coming again to the light would ascribe the disease to a *materies morbi* in the blood, of which we know little, but that, as this fibrin increases in the blood in rheumatism, the blood corpuscles decrease, the fatty matters of the blood also increasing, and that a development of lactic acid takes place at the same time in Prout's secondary assimilation process, always evinced in the deposits of the urine, in the perspiration, &c. Whether all these changes are sufficient to account for the great constitutional disturbance of acute pericarditis, of rheumatism, or are merely links of a chain beginning in a profound disturbance of the organic nervous system, and conveyed to the vascular system and, of course, to the blood, may, perhaps, be

still open to speculation. That a powerful impression by chills or cold on the nervous system, however, is the starting point of the disease in many cases there can be no doubt. The disease is very common among the poor from this cause—damp and cold, externally preventing the generation of animal heat, so connected with the proper functional activity of the organic system of nerves; influenced, also, and aggravated by atmospheric influences. The several complications we meet with depend, possibly, on pre-existing lesion, or disorders of all the particular organs engaged; that of pericarditis, or some specific connexion between rheumatic inflammation of fibrous tissues and the membrane surrounding the heart. The muscular substance of the heart suffers more or less in its nutrition in all cases of acute rheumatic pericarditis. The most frequent change is parenchymatous and fatty degeneration of the muscular fibres situated just beneath the pericardium. The fibrous thickening of the visceral pericardial layer which follows pericarditis is sometimes accompanied by the growth of fibrous tissues into the subjacent muscular substance, and a subsequent atrophy of the muscular fibres in this situation. The quantity of liquid effusion in different cases of acute pericarditis varies greatly, amounting in some cases to a few ounces only, and in other cases to a pint or more. It is usually of a yellowish colour, and contains floculi of fibrin. Wandering cells, or pus-cells, are present in the fibrinous layer and in the serum; also, in varying numbers, in the tissues of the serous membrane itself. Whether these have any other origin than emigration from the blood is still a matter of dispute.

If recovery take place, the serum is absorbed, the fibrin undergoes a molecular disintegration, and is absorbed. At the same time new connective tissue, in the form of adhesions, is developed. The process of their formation is, I think, the same as in pleurisy. The pericardial sac may be completely obliterated by the firm adhesion of its two layers, or it may be partially obliterated. The adhesions may also develop in

the form of threads and bands stretching between the pericardial surfaces.

The earliest stage of inflammation of the pericardium consists in hyperæmia of the membrane. It cannot be said that this stage has any special characteristic symptoms or physical signs. In acute cases, however, it is accompanied by increased vigour and energy of the heart's action. Without producing any bruit, this increased vigour imparts to the first sound of the heart an exaggerated ring of tone which may be sufficiently marked to enable us to suspect, if not actually diagnose, commencing inflammation of the pericardium. This "tension sound," as it has been denominated by various authors, may be regarded as the earliest objective evidence of the onset of rheumatic pericarditis. It is only in acute cases that it is observed, and in them the first stage of the disease, during which alone it is heard, lasts for a short duration, consequently this sign may readily escape detection. Even when observed, it is soon thrown into the background by the more striking and important indications of the stage following.

The acuteness of the local symptoms, viz., pain and soreness, then diminishes, and, if the amount of liquid effused be sufficient to fill or distend the pericardial sac, symptoms are added which proceed from the pressure of the liquid upon the heart. These symptoms are a sense of oppression, referable to the præcordia; a tendency to syncope on exertion, which leads the patient to refrain as much as possible from movements of the body; feebleness and irregularity of the pulse, with a notable increase on emotional excitement or any muscular effort; dyspnœa, sometimes amounting to orthopnœa if the accumulation of liquid be large and rapid; feebleness of the voice, or even aphonia, and dysphagia in some cases, produced by pressure of the distended sac on the recurrent laryngeal nerves, and on the œsophagus. Cyanosis and turgescence of the cervical veins are sometimes marked, due, probably, to pressure on the auricles and the venæ cavæ. Venous pulse on the neck is sometimes observed. Vomiting is an occa-

sional symptom. Singultus may be produced by pressure on the phrenic or branches of the pneumogastric nerve. Some cases of acute pericarditis are characterised by remarkable disturbance of the nervous system. Mental aberration, consisting in obstinate taciturnity and indifference, alternating with paroxysms of maniacal excitement under the influence of delusions which excite terror, is occasionally observed. Coma, chorea, and tetanic convulsions have been known to occur in this disease. These symptoms are apt to mark the cardiac disease, and lead the practitioner to suspect disease of the brain. Autopsical examinations show that, in these cases, neither inflammation nor any appreciable lesion of the nervous system exists, and hence the phenomena are to be referred to functional disturbance of the nervous system.

The severity of the disease, as denoted by the symptoms, corresponds to the intensity of the inflammation and the amount of effusion. If the inflammation be slight or moderate, and the quantity of effused liquid small, the disease may run its course without any symptoms denoting gravity, and the symptoms may not even point to the existence of any affection within the chest. In other cases, it is one of the most distressing and formidable of diseases. The symptoms due to compression, of course, diminish as the liquid is absorbed. The absorption sometimes goes on rapidly, and in this respect different cases present great variation. If, instead of being absorbed, the liquid continues to accumulate, and life be not readily destroyed, the pericardial sac will become greatly dilated, and the affection become chronic.

N.B.—The rapidity and completeness of recovery after absorption will depend on the amount of inflammatory exudation. This may be too abundant to be absorbed, and the disease may end fatally, after continuing for a greater or less duration in a chronic form. In cases which go on favourably towards recovery, the heart's action is feeble, and easily excited during the stage of convalescence. The symptoms are almost invariably made up, to a

greater or less extent, of those arising from co-existing affections; for, in the greater majority of cases, the disease is associated with either articular rheumatism, Bright's disease of the kidney, or pleuritis, with or without lobar pneumonitis. Under these circumstances, it is not always easy to determine to what extent certain symptomatic phenomena are due to the cardiac disease. As a rule, the development of the inflammation is attended with more or less pain, which, in some cases, is acute and lancinating, like the pain in pleuritis, and increased by forced breathing, so that the disease has not infrequently been supposed to be inflammation of the pleura. The intensity of the pain varies much in different cases; it is not always a prominent symptom, and it is sometimes slight, or wanting. The pain may be increased by acts of deglutition, eructations, and it sometimes is analogous to that in angina pectoris. The face is that of suffering and anxiety. A dry, irritable, suppressed cough is generally present. Tenderness over the præcordia is more or less marked, and pressure in the epigastrium upward in a direction toward the heart sometimes occasions acute pain. The pain produced by a deep inspiration may cause the patient to shorten this act, and hence, by way of compensation, the number of respirations per minute is increased. The alæ nasi may dilate in inspiration. Patients sometimes manifest suffering, from an indefinite sense of distress, without acute, localised pain; and in women, hysterical phenomena may be associated with the development of the disease. The action of the heart is increased, amounting sometimes to palpitation. The pulse is more or less accelerated, quick, and vibratory. These are symptoms belonging to the first stage. Pyrexia and its concomitants, namely, anorexia, debility, &c., are present.

In quick succession to the first comes the second stage, which is characterised by the effusion of lymph and the formation of a fibrous layer of new material on the surface of the inflamed membrane. The signs and symptoms of the disease at this crisis come to the front, and its existence is now diagnosed. A produc-

tion of the new material which is formed on the surface of the pericardium shows a marked alteration there. Instead of a smooth, glistening surface, permitting the visceral to glide gently and easily over the parietal portion of the membrane, there is a coating of lymph, which is so soft that its surface gets roughened by the friction to which it is subjected, its appearance becoming ragged and shaggy. The "to-and-fro" friction-sound, as described by various authors, is therefore caused by the rubbing against each other of the thus roughened surfaces of the pericardium, which is a general characteristic of the disease. This sound is generally double, but may be single, and then is usually short, and with difficulty distinguished from an endocardial murmur. Near the base of the heart it is first audible, but it may be distinct over the whole organ. In character it is superficial, like a pleuritic rub, but easily distinguished from that by its situation and by its being independent of the respiratory movements. There is no increase of dullness. Any subjective symptoms which may exist are usually felt in this stage. The processes, which are morbid, can go no further than this ; the inflammation may decline, the lymph may be reabsorbed, and the pericardium be restored to its natural condition, or the two roughened surfaces may adhere together to a greater or lesser extent.

I here need mention that, in acute cases, there is generally a third stage, which is usually characterised by the effusion of the serum into the sac of the pericardium. We shall find that a certain amount of fluid is thrown out during this second stage at the same time as the lymph. The quantity may be so small that it gives no physical evidence of its existence, and is quickly absorbed when the inflammation subsides. As a matter of diagnosis, the presence of a larger quantity gives a decided evidence of its existence, for it will be found to separate the visceral from the parietal layer of the pericardium. Rubbing of these surfaces against each other thus becomes impossible, friction ceases to be heard, and any pain which there may have been

takes its flight, in a word—disappears. The area of dullness (cardiac) is increased. If the sac of the pericardium be quite full, the region of dullness has the triangular shape of that sac—with the apex above and the base below. The extension of the dullness is to the left of, and beyond, the reflex point. As in hypertrophy of that organ, the heart's impulse is not felt. There is an indistinct and distant sound. The pulse is quick and feeble—may be irregular. There is frequency of respiration, and the patient may be in considerable distress.

I shall now proceed to make mention of some peculiar phenomena which presented themselves in cases of acute pericarditis, conjointly with the other diathesis. The case under comment was an Irishman, aged 20, and was admitted into one of the hospital wards on January 27, 1882. Symptoms of a severe attack of rheumatic fever came on five days before admission. The left knee-joint was the most affected, considerable effusion having taken place in it. There was no satisfactory cause for this attack, as the patient had not been exposed to cold in any way, and had been in excellent health just previous to its occurrence. He was a strong and well-nourished man, and did not appear by any means a bad subject for the malady. On the day (28th) after our patient's admission, it was observed that his breathing was embarrassed and quickened. And when we came to examine him we found evidence of the existence of pneumonia affecting the posterior part of the lower lobe of the left lung, in which situation there was dullness on percussion; the breathing was bronchial, while the vocal vibrations were felt by the hand applied to the wall of the chest. He was treated in the ordinary way. A gentle purgative was administered, turpentine stupes were applied to the chest, and afterwards a blister was put on. The joints were wrapped up in salicylic cotton wool, and covered with oiled silk, and he had ten grains of Dover's powder at bed-time. On the 29th, our attention was attracted to a peculiarity in the pulse, which, hitherto having been at 108 and 100, had now fallen to 92.

and had become intermittent. The change of pulse excited my suspicion that there was something wrong about the heart, as we seldom, in such cases, find a sudden change in the character of the pulse, without there being some mischief commencing in that organ. For this reason the state of the pulse is often a most important guide, not only in rheumatic fever, but also in acute rheumatic pericarditis ; and any change in it, whether it be from quick to slow, or *vice versa*, or whether from being steady and regular it becomes vacillating and intermittent, should instantly direct our attention to the heart. There is the greatest variety in the way in which inflammation disturbs the heart's action, in some cases depressing it and causing it to vacillate and intermit ; in others, creating considerable acceleration of it. In this case, the heart's action became decidedly intermittent, and upon examination a faint rubbing sound was heard at the base of the heart. There was also some suspicion of the existence of a bellows-sound at the heart's apex ; but, as the sound was extremely faint, it was impossible at the time to decide whether it was a faint bellows-sound or a friction-sound. The subsequent course of the case leaves no doubt that it was the latter. I notice the fact here to found upon it a remark that it is often very difficult, or even impossible, to determine between a bellows-murmur and a friction sound. I have no doubt that a faint sound of the latter kind is often mistaken for a bellows-murmur, and has probably led some physicians to assign to endocarditis a greater frequency of occurrence than it can justly claim. So far we had only the quality of the sound to rely on—a feature by which an experienced ear will often have no difficulty in determining its true nature, but which is far from affording unequivocal evidence. However, as the case went on, we were able to obtain other characters more easily appreciated and more generally to be relied upon. There was, then, up to this point, quite sufficient evidence of the existence of pericarditis rheumatic, and pneumonia. Let me remark here that pneumonia is more frequent in rheumatic than in other

constitutions, and is now fully recognised as one of the complications of rheumatic fever for which the practitioner must keep on the look-out. Rheumatic pneumonia is apt to attack both lungs; it has, likewise, a disposition to wander, appearing in one part of the lung, then leaving this and invading another portion. In this patient both these features were present; the pneumonia disappeared from the base of the left lung, and attacked a circumscribed region on both sides, situated a little below the spine of the scapula, and extending to within a short distance of the vertebral column.

To complete the signs of rheumatic pneumonia and pericarditis in this case, we found that our patient expectorated sputa, which were very viscid, and were tinged with the rusty colour so characteristic of pneumonic expectoration. The treatment hitherto adopted consisted in counter-irritation by turpentine stupes applied freely over the posterior surface of the chest, and by a blister placed on the region of the heart. He was well purged with carbonate and sulphate of magnesia, and took a grain of opium, with nitre and ipecacuanha, every four hours. On the 30th of January, the physical signs already described had become distinct. The rubbing sound was louder, and exhibited at once the peculiar roughness, as well as the "to-and-fro" character, by its accompanying both systolic and diastole. All indications of a bellows-murmur had now disappeared. The signs affecting the lungs began to improve, and there was distinct evidence that resolution was taking place; coarse crepitation was audible where the bronchial breathing had been heard; and the sputa were less viscid, but the signs of oppression of the heart had increased. The respirations were more frequent, and of a catching character. He was now breathing forty-four times in a minute, and each inspiration was accompanied with a peculiar catching movement of the diaphragm, as in hiccough, but there was ample evidence that the air entered the greater part of both lungs. In the lower part of each side, particularly behind, a moist crepitation accompanied

both inspiration and expiration, and when the hand was placed over that part of the chest a peculiar rough and vibratory sensation was distinctly perceived, such as would be caused by two rough surfaces moving the one upon the other. The crepitation was at first very moist in character, and it became a question whether it was intra-pulmonary, and due to the passage of air through moist secretion in the bronchial tubes, or whether it depended upon the presence of moist lymph on the surface of the pleura. Sometimes large flakes of loose moist lymph are formed on the surfaces of the pleural membrane, and by the rubbing of such flakes together a sound is generated very like the large crepitation which occurs in bronchial tubes filled with mucus. And, in some instances, you will find it very difficult to distinguish the one from the other. Generally speaking, the pleuritic rubbing accompanies both inspiration and expiration, while the bronchial crepitation either accompanies inspiration only, or is much more intense during inspiration. In the present case, the sound was equally distinct with inspiration and expiration, and soon lost its very moist character, assuming the creaking nature of the friction-sound. Thus we now found an additional complication in the case—a pleural rubbing sound had made its appearance, and was accompanied with respiration of a peculiar catching character, as if the diaphragm was impeded in its action. And there was, likewise, not only that remarkable expression of restraint which the countenance is so apt to assume when the pericardium is affected, but it now exhibited somewhat of the sardonic grin, which, accompanying the catching movement of respiration, led me to infer the pleurisy, and not only so, but the distressing and dangerous form of diaphragmatic pleurisy.

The symptoms of irritation of the diaphragm, however, soon subsided, and for some days matters seemed to go on well. Our patient had been put upon mercury (calomel and opium), and the blistered surfaces were dressed with mercurial ointment. In the course of six days his gums became sore, and the usual fetor

affected the breath. This, under ordinary circumstances, I should have regarded as a favourable sign, since in general, when the pericardial inflammation is very extensive, we do not find the mercury take hold of the system so quickly; however, in this case, the speedy action of the mercury might have been attributed to some degree of disease of the kidney, for albumen was present in increasing quantities in the urine.

The symptom which now became most distressing to our patient was quick breathing. The number of respirations never fell below thirty-two, was generally forty, but, on the slightest exertion, would rise even as high as seventy. This was partly to be attributed to his temperament, which was highly nervous and anxious. He was extremely impatient of pain, and was exceedingly restless and hard to please. It was not caused by anything wrong with the lungs, for the pleuro-pneumonic signs had greatly abated; it was mainly referable to the state of the heart. There was an increased extent of dullness over the præcordial region, chiefly towards the right side, and this I attributed to some amount of fluid effused into the pericardium, but you will remember that I stated that this could not have been very extensive, as the friction-sound continued to be audible at the heart's apex as well as at the base. Now, you may still continue to hear a pericardial friction-sound at the heart's base, notwithstanding the presence of fluid in the pericardium; but such will not be the case at the apex, for this will be pushed back by fluid accumulating in the bag, and away from contact with the parietal serous layer, unless there have been some previous band of adhesion stretching between the two surfaces. For this reason I felt certain that as yet no great amount of liquid effusion had taken place, but there was too much reason to fear that the surface of the heart, in front at least, was covered with lymph.

A new sign now attracted our attention, and puzzled us not a little, and ultimately led me somewhat astray in diagnosis. On the 7th of February, we found great resonance of the lower half

of the left side of the chest ; behind, in fact, it had become tympanitic, and there appeared to be a bulging of the walls of the chest in this situation. Upon listening over this region we had a sound resembling that produced by air passing through liquid, and creating a succession of bubbles, which broke upon the surface with a metallic sound ; this sound was synchronous with, and apparently caused by, inspiration. The chest was likewise tympanitic on percussion at the left side in front, and in the lateral region. Metallic tinkling was very manifest over the whole of the lower part of the side of the chest on surcession.

Now a highly tympanitic state of chest, coming on suddenly or with great rapidity, naturally suggested the idea of air getting in some way into the pleural cavity. This might take place either by the rapid secretion of air in that part, or by the rupture of a small abscess of the lung, and the perforation of the pulmonary pleura, through which air will readily pass at each inspiration into the cavity. But there was one sign absent in this case which must of necessity have occurred, for a time at least, if a perforation existed, namely, amphoric blowing—a sound precisely resembling that caused by blowing air into a glass jar containing air and water.

Had the signs which I have enumerated—viz., the tympanitic percussion sound, and the gurgling and metallic tinkling—been found on the right side, they could not have been explained otherwise than on the supposition that air and fluid existed in the sac of the pleura, or in some large thin-walled excavation of the base of the lung. But these signs were on the left side ; and here, you will bear in mind, is the stomach, which, when large and distended with air, may push up the diaphragm very much, so as to incommode the heart and to interfere with the freedom of its action. A large and dilated stomach, well filled with air, will render the lower third or fourth of the left chest tympanitic ; and if it be partially filled with liquid, it will give metallic tinkling on percussion. Now, our patient was just the subject in whom we might expect rheumatic phenomena such as these to be caused by

the stomach. He was one of the hard-working, ill-fed class of Irish labourers, who, living chiefly on potatoes, and taking a good deal of liquid also, are apt to have very large stomachs, in which wind is largely generated, and accumulates to a considerable extent. There is no doubt that we might have rested content with this explanation of the signs in question, and more especially as the tympanitic state remained confined to the lower part of the chest in the semi-erect posture, and as there was no displacement of the heart, which invariably takes place when any considerable quantum of air or fluid is effused into the left side of the chest. The question then was, Were these signs—the metallic tinkling, the gurgling, the tympanitic state of the lower part of the left chest—due to air and fluid in the cavity of the pleura, or to air and fluid on a large dilated stomach? Although I made no positive diagnosis, I confess I leaned much to the former view. The gurgling was so clearly connected with inspiration as well as with expiration—a phenomena which I had not previously noticed thus associated—and the tympanitic state ascending so high in the chest, that I could not satisfy myself that these signs could arise from a dilated stomach containing air and fluid. And the absence of the other signs, to which I have alluded, admitted of some explanation. Thus, the pleurisy, which we had already recognised, by causing a line of adhesion between the pleura, would have impeded the ascent of the air, and thus limited the tympanitic state to the lower part of the chest; the same cause, by confining the air within a circumscribed cavity, would prevent displacement of the heart; and, furthermore, the absence of amphoric blowing might be accounted for by supposing that the fistulous opening became plugged up soon after its formation. The case was further complicated by the occurrence, just at the time these signs appeared, of a profuse purulent expectoration, precisely such as might have come from a pneumonic abscess pent up in the substance of the lung. We were not kept long in suspense *à propos* the explanation of these signs. Our patient began

to show evident indications of a failure of vital power. He sweated profusely, his pulse became very rapid and weak, and ultimately intermittent and irregular, his dyspnoea increased, and he died on the 13th. The only new sign connected with the breathing which occurred was this:—On the 11th, we found that, close to the inferior border of the scapula, bronchial breathing of a metallic character was audible over a space about the size of a crown piece.

We proceeded to the post-mortem examination with not a little curiosity to ascertain how far the diagnosis was correct. Let me here remind you what the diagnosis was. We made out then, first, pericarditis with extensive effusion of lymph; secondly, effusion of liquid into the pericardium, but not such as to remove the apex of the heart from contact with the parietal layer of the serous pericardium; thirdly, pleurisy at the base of both lungs, with lymph on the pleura in that situation, and also to some extent on the diaphragmatic pleura; lastly, it was conjectured that air had formed or escaped from the lung into a cavity circumscribed by lymph within the pleural sac, and was partially filled with liquid. Before the body was opened, percussion was made over the chest in the region which had been tympanitic during life. It was found that the tympanitic state had disappeared. A puncture was next made in one of the intercostal spaces on the left side, but there was no escape of either air or liquid. It was plain, then, that the last part of the diagnosis was not correct. I shall explain by-and-by how the phenomena which we noticed during life were produced.

On opening the chest in the usual way, we found the pericardium distended in great part with fluid. As much as fourteen ounces of bloody serum were obtained from it. The whole heart, both in front and behind, was covered by thick rough lymph, with numerous papilliform processes projecting from it, and the corresponding surface of parietal pericardium was in a similar condition. The apex and great part of the left edge of the heart was

adherent to the parietal layer of the pericardium. For this reason the fluid was forced to the right side, and lay upon and compressed the right ventricle.

From the above description we can fancy how firm the adhesion of the heart to the pericardium on the left side had been during lifetime. It was owing to this cause that we continued to hear the friction-sound notwithstanding the presence of the fluid in the sac. The quantity of the effusion exceeded my expectations, and certainly the extent of the dullness on percussion did not justify the supposition that a very large accumulation of fluid had taken place. The adhesions on the left side prevented the fluid from spreading to that side, and caused it rather to push the heart back into the posterior mediastinum and upon the left lung. It is probable, likewise, that a large part of the effusion took place during the last few days of life. No careful examination of the heart had been made since the 9th (four days before his death), and on that day it was observed that the heart's sound was muffled.

The effusion of the lymph was not confined to the anterior surface of the heart; it covered the posterior surface likewise. So great was the accumulation of fluid in the pericardium, and so much did it press backward, that a portion of the left lung was found much compressed and pushed upwards and backwards. The compression was sufficient to produce, in the portion of lung pressed on, that condition which Lænnec describes under the name of carnification, in which, by prolonged compression, the air is expelled from the air-cells, and the lung assumes a non-crepitant, solid, fleshy character. The condition is the same as that which is produced by the compression of a pleural effusion. It was but a small patch of the lung that was thus carnified, and that corresponded to the situation in which we heard bronchial breathing on the 11th.

The pleuræ on both sides had several patches of thin lymph on them, especially over the lower lobes; and the diaphragmatic

pleura was likewise similarly coated, that portion on the right side exhibiting the thickest layer of lymph. The bronchial mucous membrane was highly congested, and as red as velvet, and the tubes were filled with muco-purulent fluid like what he expectorated.

Thus, then, in all the main points, the diagnosis was correct; it failed, however, to explain the tympanitic state of the lower part of the left chest, and the gurgling and tinkling heard there. All these signs were due to the stomach, which, as we expected, was a large one. The diminished size of the left lung, owing to its compression of the large heart and distended pericardium, probably allowed the stomach to ascend into the chest higher than it was wont; and the adhesion of the diaphragm to the pleura, covering the base of the lung, permitted the movements of the chest to be communicated more readily than is usual to the stomach, giving rise to the gurgling which accompanied inspiration and expiration, and to the metallic tinkling which we so often heard.

I think that, in this instance, the error of diagnosis—or, rather, the passing over the right one—was due to my not having attached its full share of importance to the absence of amphoric breathing. The proximity of a large stomach, generally distended with a great quantity of air, and always containing more or less fluid, afforded a sufficiently obvious explanation of the phenomena, and which I should most probably have adopted were it not that the tympanitic state reached so high up in the chest. On another similar occasion, a fair test of the formation of the tinkling sound in the stomach may be obtained by applying the ear to the lower part of the chest while you may make the patient swallow, and comparing the sound thus produced with that caused by surcession, and by the forcible movement of the chest.

Now as to the treatment. This, as I have previously mentioned, was by opium, purgatives, and blisters in the first instance, to which was soon added the exhibition of mercury in full dose.

Counter-irritation was used freely to various parts of the chest, and, latterly, when the patient's powers seemed to fail, wine was given in moderate quantities.

There are some who would say that free bleeding, adopted early, would have stopped the pericardial inflammation at once, and so have saved the patient. The answer to this is as follows, viz: that many cases have been bled, both early and largely, by others as well as myself, and that the result has not been more favourable than in this instance; the patient has died with quite as great a coating of lymph on the heart, and quite as much, or more, effusion into the pericardium. Indeed, I have a strong opinion that large bleedings favour liquid effusions, they make the blood more watery, and, by diminishing its coloured particles, impair the vigour of its vital changes.

Another question again might be asked, Why local bleeding was not tried over the region of the præcordia? To this I reply, because, in many previous trials, I have found it inadequate to the object in view. Application of leeches, and blisters over the region of the heart, seems more beneficial; all very active anti-phlogistic treatment in these cases should be abandoned, as being not only ineffective but mischievous. Mercury, in this case, was given freely, a treatment which, although perhaps not always necessary, ought to be pursued in severe cases, as I cannot doubt that the free administration of mercury tends to limit the effusion of lymph, and also to promote its absorption. Opium was given with the calomel, in frequent repeated doses. Opium relieves pain, checks the extension of disease, and quiets the nervous system in many forms of serous inflammations. It is of paramount importance in the treatment of peritonitis, and acts very favourably in inflammation of the pleura and pericardium. Free counter-irritation was also adopted here; large blisters were applied to the chest and to the region of the heart, and turpentine stupes were frequently had recourse to.

CHAPTER XV.

SUMMARY COMMENTS ON SOME OF THE CAUSES OF RHEUMATIC PERICARDITIS, AND BRIGHT'S DISEASE OF THE KIDNEY.

IN concluding my rapid survey on this important form of disease, it has always been my great desire to determine what are the principal courses of acute rheumatic pericarditis, and to ascertain their frequency, both absolutely and relatively to each other, and in arriving at a conclusion, I do not profess to investigate all the causes of pericarditis, but firstly to inquire—What were the causes actually observed in all the examples of the disease which have fallen under my notice, and in the next place, as I have investigated more in detail, their frequency, both absolutely and relatively to each other, as well as some other of the circumstances connected with each of the causes as observed. And lastly, I have likewise examined, incidentally, the influence of the same causes in producing inflammation of other internal organs, both in connection with, and independently of, pericarditis. The cases of acute and severe pericarditis examined exclusively from those mentioned in the tables, were thirty-five in number. Of these :—

- 19 Occurred in the progress of acute rheumatism.
- 10 Occurred in connection with Bright's disease of the kidney.
- 3 Others may have had Bright's disease ; but if not the cause is unknown.
- 1 Occurred with malformation of the heart and consequent cyanosis.

- 2 Were produced by the extension of inflammation from neighbouring texture, in one from the liver and a diaphragm, and in one from the left pleura.

Total 35.

These severe cases of pericarditis may again be conveniently subdivided into two smaller groups.

1st. Those occurring in persons previously in good health, or in the course of an acute disease. And 2ndy. Those occurring in persons in bad health, or in the progress of some chronic disease. A remarkable and important difference will be found in those two divisions, in relation to the cause of the disease.

Of twenty-nine cases examined, with a view to this difference, sixteen belong to the first, and thirteen to the second, of the two divisions just described.

Of the cases in the first class, all were complicated with acute rheumatism, and none of them, so far as is known, with Bright's disease. Of the cases in the second-class only one was complicated with acute rheumatism, whereas fully two-thirds were known to be associated with Bright's disease, and all of them may have been.

The two great causes of pericarditis therefore, appears to have been acute rheumatism, and Bright's disease of the kidneys. This now leads us to another consideration, viz., that these two diseases owe their power of inducing pericarditis to the same ultimate cause, *i.e.*, an alteration in the composition of the blood. These, however, will not determine as to whether the alteration in the blood be essentially the same, in relation to the production of pericarditis, in the two diseases referred to. If it be assumed, however, that the pericarditis, which was associated with cyanosis, likewise depended upon the state of the blood in that disease, it will then appear that only two generic causes of the inflammation of the heart were observed in the thirty-five cases under considera-

tion, (*viz.*), a morbid condition of the blood, and extension of inflammation from a neighbouring texture.

My next examination was directed to adhesions of the pericardium, and of white spots upon it, with reference to the causes of the inflammation producing them ; and the conclusion I arrive at is, that in every case in which any information is given upon the subject, there had previously been either acute rheumatism or pleurisy, or there was found actually existing, either Bright's disease, or some other disease of the kidneys.

The two chief causes of acute pericarditis which were thus observed, (*viz.*), acute rheumatism, and Bright's disease of the kidneys, are next examined with more detail.

1. *Of acute rheumatism as a cause of Inflammation of the Heart.*—

The frequency of acute rheumatism, as an observed cause of pericarditis, has been already stated ; it was observed in two-thirds of all the cases of the latter disease.

The complementary inquiry, *i.e.*, into the frequency of inflammation of the heart, in cases of acute rheumatism, remains now to be made. Of another seventy-five cases of acute rheumatism, treated by me, I observed that thirty-seven, or about one half, had morbus cordis of some kind or degree ; the rest had probably none. Among these seventy-five cases of rheumatism, there occurred six of acute pericarditis of considerable severity, besides two very slight cases. The proportion of the former, therefore, was one in twelve and a half cases.

In the seventy-five cases of rheumatism, there were thirty-two cases of valvular disease of the heart, either old or recent, besides two known to be recent. There was, therefore, one case of valvular disease in about every two cases of rheumatism. In comparing these results with those of various writers upon the same subject, I form a comparison as follows, *viz.* :—

1. That acute inflammation of the heart has seemed less frequent as a complication of acute rheumatism in my experience, than it has been believed to occur in the experience of those

writers whose opinions seem to have been most generally adopted by the profession.

2. That the frequency of inflammation of the heart, even in my cases, has been such as abundantly to show the great influence of acute rheumatism in its production.

I shall here make an attempt to ascertain the real amount and the causes of the difference between the observations of the author and those of the writers referred to. The result, as it respects most of these writers, may be briefly stated to be—

1. *Of Pericarditis*.—In those instances in which such data have been given as enable us to compare similar cases, the results are very nearly the same. In various instances, however, no comparison can be fairly made. Either from the want of figures, from the mixing together of cases of endocarditis and of pericarditis, or from a great difference in the age of the subjects.

2. *Apropos Endocarditis*, the discrepancy is much greater than in the case of pericarditis, and one of the chief causes of the difference appears to me to be, that most of the writers have given the proportion of cases of valvular disease in acute rheumatism in such a manner as implies (when it is not directly stated) that they were all cases of acute disease—omitting, therefore, to distinguish the proportion of them which were of older date.

The proportion of cases of valvular disease of all dates observed by the author is nearly the same as that observed by many writers that I have referred to, but I shall further attempt to shew :—

1st. That a greater number of these are examples of old valvular disease.

2nd. That, at all events in most cases, it is very difficult to distinguish when the disease is recent and when old,— and,

3rd. As far as I have been able to ascertain, acute endocarditis is less frequent than acute pericarditis in rheumatism. We shall now inquire into the frequency of morbus cordis in chronic rheumatism, and compared with that in acute rheumatism. From this inquiry it appears to me that the

(a) Total cases of morbus cordis, and its number, old and recent, is nearly the same in two kinds of rheumatism.

(b) That acute inflammation of the pericardium, and of the endocardium is much more common in cases of acute, than of chronic rheumatism. The frequency of other internal inflammation in the course of acute rheumatism was next examined, and compared with that of inflammation of the heart, and the result is that the last mentioned inflammation exceeds every other in the frequency of its occurrence.

The next subject for examination is—the circumstances which favour the occurrence of inflammation of the heart in the progress of acute rheumatism.

1st. *Metastasis*.—Metastasis of the rheumatism did not occur in any one of the cases observed. It is inferred that this is not the ordinary, nor even a frequent, mode in which rheumatism produces cardiac inflammation. It does not, however, follow from these facts that metastasis never takes place, and I will attempt to show that its occasional occurrence is both consistent with theory, and established by observation.

In memento, the tables will show :—

(a) Some cases of rheumatism, in which the inflammation of the heart appeared before that of the joints.

(b) Some cases of what has been termed “rheumatic fever without arthritis,” *i. e.*, cases presenting all the symptoms of acute rheumatism except the affection of the articulations.

(c) In one of the cases (private) I think it probable that there may have been acute rheumatism, and in which there was pericarditis, but no affection of the joints throughout.

2nd. *Form of the Rheumatism*.—Adopting the form of rheumatism and its divisions as given by Senator of Berlin, we find that all the cases of rheumatic pericarditis occurred in connection with the fibrous as distinguished from the capsular form of rheumatism. In estimating the influence of this circumstance, how-

ever, it is necessary to remember that the fibrous variety of rheumatism is much more common than the capsular.

3rd. *Intensity of the Rheumatism.*—From the cases examined, it appears to result that the violence and fatality of rheumatic pericarditis are generally greater in the cases in which the accompanying rheumatism is very acute, than in those in which it is sub-acute. Now, whether pericarditis be more frequent in the more severe than in the less severe form of rheumatism, the author's cases do not enable him with confidence to determine. As far as they go, however, they are opposed to such a view, for three-fourths of the examples of rheumatic pericarditis occurred in sub-acute rheumatism.

4th. *Stage of the Rheumatism.*—In more than half the cases of rheumatic pericarditis, the affection of the heart appeared on or before the fourth day of the disease. With one exception the pericarditis did not appear sooner in those cases in which it was very severe, than in those in which it was much less severe.

5th. *Influence of Repeated Attacks of Rheumatism.*—In the cases examined, pericarditis was found to be both more frequent and more severe in the first than in subsequent attacks of rheumatism.

6th. *Previous Disease of the Heart.*—Ten out of fifteen patients had no previous disease of the heart, and among these were found most of the cases of pericarditis.

7th. *Age.*—Of fifteen patients, nine, or about two-thirds, were only twenty years of age or under, five were between twenty and twenty-six, one was above forty, and another sixty.

8th. *Sex.*—Of fifteen patients, nine were males, and six were females. It is necessary, however, to remember that rheumatism is more common among men than women.

9th. *Influence of Venesection.*—Twelve of the patients had not been bled before the pericarditis appeared, the remaining three were bled, one eleven days, one five days, and one three days, before the pericarditis supervened.

Mode in which Rheumatism produces Pericarditis.—Upon this question, I have adopted the following hypothesis as consistent with all the facts I am acquainted with. The cause of acute rheumatism is probably the presence of some morbid matter in the blood, which has an equal affinity for the fibro-serous tissues of the body, and which by fixing itself in one or more of these, induces various local inflammations. The similarity of the structures implicated is probably the reason why rheumatic pericarditis or endocarditis often occurs at the same time with or succeeds to rheumatic inflammation in the joints, just as rheumatic inflammation in one joint occurs with or succeeds to that in another; and the heart is more frequently (?) and more severely affected in severe cases of rheumatism acuta, for the same reason that more joints are affected, and more severely affected, and also that more fever is present in such cases; which reason may not improbably be a greater abundance of the materies morbi in the blood.

II. *Of Bright's Disease of the Kidneys* as a cause of Inflammation in the Heart.—We have already seen that of thirty-five cases of pericarditis, Bright's disease was the only assignable cause of the inflammation in thirteen, or more than one-third.

It now remains for us to institute the corresponding and complementary inquiry into the frequency of pericarditis and endocarditis in Bright's disease.

(a) In the bodies of fifty patients, who had either died of Bright's disease, or who were ascertained to have this disease in an advanced stage.

Acute Rheumatism was found in 5 or in	1	out of	10.
And Acute Endocarditis ,, 4 ,,	1.	,,	12.

(b) On the other hand in 142 bodies, in which the kidneys were not affected with any appreciable disease.

Acute Pericarditis was found in 4 or in	1	out of	35.
And Acute Endocarditis ,, 2 ,,	1	,,	71.

Pericarditis and Endocarditis, therefore, being four times more frequent in fatal cases of Bright's disease than in fatal cases without renal disease, it seems clearly to follow that the influence of Bright's disease in producing these inflammations is unquestionable and great.

III. *The frequency of other internal inflammations in fatal cases of renal disease*, is next examined and compared with their frequency in fatal cases without renal disease. From this comparison it appears—

1st. That the proportional number of acute internal inflammations, exclusive of those of the heart, is twice as great in the series of cases with renal disease, as in that without such disease, the numbers being respectively sixty and thirty-six per cent.

2nd. That the proportion of patients, likewise, among whom these inflammations were distributed, is greater in the former than in the latter series of cases; the numbers being respectively sixty and thirty-six per cent.

Hence, we may safely infer that Bright's disease has a greater tendency to produce other internal inflammations besides those of the heart.

IV.—*A further examination of the same facts*, shows that the relative frequency of various internal inflammations is different in fatal cases of Bright's disease and of other diseases taken indiscriminately.

The following are the various inflammations inquired into, arranged in the order of their frequency, as they are calculated to be due to renal disease, or to the causes operating in other fatal diseases.

(a) *Inflammations due to renal disease*.—Cerebritis, Pneumonia, Pleuritis, Pericarditis, Endocarditis, Meningitis, Peritonitis.

(b) *Inflammations independent of renal disease*.—Pleuritis, Pneumonia, Peritonitis, Meningitis, Cerebritis, Pericarditis, Endocarditis.

V. *From a comparison of the* numbers given in these pages, we may calculate the tendency to produce various internal inflammations of the causes operating in fatal cases of Bright's disease, as compared with those present in cases without renal disease.

If we use the term Bright's disease, to represent all the causes operating in fatal cases of Bright's disease, and then compare these with the causes in operation in fatal cases, without any renal disease, we shall find that Bright's disease produces :—

1. Endocarditis, almost 5 times as often as all other causes put together.				
2. Cerebritis, fully	3½	„	„	„
3. Pericarditis fully	2½	„	„	„
4. Pneumonia just	„	„	„	„
5. Pleuritis just	¾	„	„	„
6. Meningitis,	3 times less frequent than			„
7. Peritonitis,	100	„	„	„

My next enquiry was to ascertain the comparative efficacy of acute rheumatism and of Bright's disease, in producing pericarditis and other internal inflammations.

In comparing these two affections, I met with some difficulty arising from the fact that, one of them is an acute disease, and is seldom fatal, whereas the other is chronic and generally fatal. It therefore appears to me that the best way of avoiding this difficulty is, by comparing fatal cases of Bright's disease with ordinary cases of acute rheumatism. If the object were to ascertain the proportion of cases, in which traces of previously existing inflammation were found, this method would be objectionable, because the one disease having run a much longer course than the other, it would have had much more time to produce any inflammation which it had the power to produce ; but if cases of actually existing inflammation alone be counted, then the objection does not exist, and the result should not be far from the truth.

Of seventy-five cases of acute rheumatism, eight were complicated with pericarditis acuta, or one in nine and a half.

Of fifty fatal cases of Bright's disease, five were complicated with pericarditis acuta, or one in ten.

Hence, Bright's disease in the advanced stage, and acute rheumatism appear to have caused acute pericarditis in an equal proportion of cases.

An examination of twenty cases of old adhesion of the pericardium, however, shows what the consideration stated above might have led us to anticipate, that old adhesions of the pericardium have been produced twice as often as Bright's disease, as by previous attacks of acute rheumatism. From considerations which could not readily be intelligible in this abstract, the inference is next drawn that acute rheumatism has a greater tendency to produce pericarditis, than has Bright's disease in its earlier stages, and consequently that the tendency of Bright's disease to induce pericarditis and probably also other internal inflammation increases in proportion as the affection of the kidney is more advanced.

The conclusion thus aimed at is quite in accordance with the *modus operandi* of Bright's disease, in producing local inflammation which has been assumed in an earlier part of this work ; for, if this effect of renal disease depend upon a morbid condition of the blood, arising from the excessive accumulation of urea, we should expect the effect to increase in proportion, as the structure and the functions of the kidneys, and the consequent composition of the blood deviate more from the healthy condition.

APPENDIX OF CASES.

ALKALINE TREATMENT.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
1	24	F.	14 days.	Both ankles red and swollen. Skin natural. Tongueslightly coated. Bowels regular. Pulse 80.	R Potass. Bicarb. ʒ ss. Aquæ Gum Acaciæ ʒ iv. quater die. On 10th day shoulder vesicated. 12th day, potash omitted. 25th day, Tinct. Iodini to shoulder, and Potass. Acet. ʒ j. ter die.
2	39	F.	4 weeks.	Left thumb, right knee and back affected. Tongue coated. Bowels regular. Pulse 76.	R Potass. Acet. grs. xx. quater die. Doubled on third day. Omitted on 20th day.
3	34	F.	13 days.	Pain and swelling of knees and ankles. Tongue coated. Appetite good. Pulse 96.	R Potass. Acet. ʒ iss. ter die.
4	32	F.	20 days.	Pain in all the joints. Considerable sweating. Appetite good. Sleep poor.	R Potass. Carb. grs. x. Aquæ ʒ iii. ter die. On 12th day replaced by Potass. Acet. grs. x. ter die.
5	45	F.	10 days.	Pain and swelling of right knee and ankle. Left wrist painful. Skin warm. Tongue with yellow coat at centre.	R Potass. Acet. grs. x. ter die. 2nd day increased to ʒ ss.
6	17	F.	6 days.	Pain and swelling of left knee. Pain in left elbow. Tongue moist with white coat. Pulse 116. No appetite. Much thirst. Bowels costive.	R Potass. Acetate ʒ i. quater die.
7	22	F.	7 days.	Pain in both elbows, shoulders and right thumb. Tongue coated white. Much thirst. Appetite poor. Catamenia regular. Pulse 76.	R Potass. Acet. ʒ ij. ter die. Increased on third day to a ʒ j. Omitted on 8th day.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	On 2nd day all joints were affected. After that, steadily improved until 25th day, when attack was renewed after exposure.	60	Well.
Normal.	General and steady improvement after 2nd day.	30	Well.
Normal.	Steadily improved.	28	Well.
Normal.	Gradual. Delayed by gastric disturbance.	50	Improved.
Normal.	Rapid.	25	Well.
Normal.	Rapid.	14	Well.
Normal.	Rapid.	16	Well.

<i>No.</i>	<i>Age</i>	<i>Sex</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
8	40	F.	21 days.	Both feet and ankles, also right hand and shoulder red, much swollen and very painful. Tongue with thin brownish coat. Appetite fair. Urine scanty and high-coloured, with abundant deposit of urates. Bowels constipated. Catamenia regular.	R Chamber's mixture, 3ss. ter die. Sulphur and bathing round swollen joints.
9	22	F.	3 days.	Pain without redness or swelling of large joints of lower extremity. Tongue with creamy coat. Pulse 112. Much thirst. No appetite.	R Potass. Acet. et Bicarb. aa 3ss. every 4 hours. 9th day, Acetate omitted. 11th day, Potass. Iod. grs. v. ter die.
*10	20	F.	5 days.	Pain in right shoulder, wrist and knee. Tongue with thin white coat. Pulse 124. Appetite poor. Bowels regular.	R Potass. Acet. et Bicarb. aa 3ss. quater die. 23rd day, omitted.
*11	18	M.	20 days.	Pain and swelling of knees and ankles. Tongue with thin white coat. Bowels regular. Pulse 56, irregular.	R Potass. Acet. 3ss. quater die.
*12	22	F.	3 days.	Redness, pain and swelling of knees, ankles and wrists. No appetite. Bowels regular. Tongue with thin white coat. Pulse 120.	R Potass. Acetate et Bicarb. 3ss. ter die. 4th day, Potass. Acet. grs. xx. substituted. 20th day, Tonics substituted. Potass. resumed in 10 days. 42nd day, Potass. Iod.

* Private Patients.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid.	21	Well.
Normal.	Became chronic.	53	Well.
Normal.	Gradual.	37	Well.
Before admission complained of occasional palpitation. Second day, systolic souffle over base. Loudest between cartilages of 4th and 5th ribs, near sternum. Faint near apex.	Continual improvement.	10	Well.
On admission faint, systolic murmur at base, 12th day improved. 13th day, souffle at end of 1st and during 2nd sound. Complained of palpitation.	Very slow; pain shifting from joint to joint.	50	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
13	21	F.	5 days.	Pain, redness and swelling of larger joints. Tongue with thick white coat. No appetite. Much thirst. Bowels costive. Pulse 108.	R Second day, Potass. Bicarb. \mathfrak{g} ss. every four hours. 7th day omitted. 10th day resumed.
14	25	M.	4 days.	Pain and swelling of all the larger joints. Acid perspiration. Appetite poor. Tongue with moist, white coat. Pulse 102. Intermittent.	R Second day, Potass. Acet. et Bicarb. aa. \mathfrak{z} ss. every 4 hours for 2 weeks.
15	46	M.	5 days.	Right knee and leg swollen and painful. pulse 84. Tongue with light, white coat. No appetite.	R Potass. Carb. \mathfrak{z} ss. Potass. Acet., \mathfrak{g} j. Aquæ \mathfrak{z} j. ter die. 11th day, Potass. Iod. grs. v. ter die.
16	23	M.	8 days.	Pain and swelling of knees, feet, elbows, and hands. Good appetite. Bowels costive.	R Potass. Bicarb. \mathfrak{z} ss. Potass. Acet. \mathfrak{g} i. Aquæ \mathfrak{z} ij. ter die.
17	24	M.	7 days.	Swelling and pain in both legs. Bowels regular. Urine scanty.	R Potass. Acet. et Bicarb. aa. \mathfrak{z} ss. ter die.
18	33	M.	25 days.	Pain in legs and right shoulder. Bowels regular. Considerable thirst. No appetite.	R Potass. Acet. et Bicarb. aa. \mathfrak{z} ss. ter die.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Systolic and diastolic souffle over base on admission. Gradually grew less, and disappeared.	Gradual.	37	Well.
On admission sounds were normal. Heart intermitted every 5th beat. 4th day, souffle after first sound at base. 9th day, distinct friction sound. 10th day, increased area of dulness. In two weeks all these had disappeared. Heart normal when discharged.	Gradual, with relapse.	43	Well.
Normal.	Continual improvement.	23	Well.
Normal.	Rapid.	14	Well.
Pain in Cardiac region on admission. 3rd day, slight souffle following 2nd sound.	Rapid improvement.	14	Well.
Normal.	Rapid improvement.	10	Well.

No.	Age	Sex	Duration before Admission	Character of Attack on Admission.	Treatment.
19	19	F.	7 days.	Pain in right leg and left knee, and in abdomen. Bowels costive. Urine high coloured. Headache, thirst, and anorexia.	R Potass. Acet. Potass. Bicarb. aa ʒ j. Aquæ ʒ ij. ʒ ss. ter die.
20	27	F.	5 days.	Both feet swelling and painful. Tongue moist, with creamy coat. Appetite and sleep poor. Pulse 96.	R Potass. Bicarb. ʒ iss. Aquæ ʒ vi. ʒ j ter die. 30th day, Potass. Iod. gr. v ter die.
21	18	F.	3 days.	Pain and swelling of knees and hips. Bowels costive. No fever.	R Third day, Potass. Acet. et Bicarb. aa ʒ ss. ter die.
22	48	F.	5 days.	Knees, feet, shoulders, and hands red, swollen, and painful. Tongue with yellowish white coat. Much diaphoresis. Good appetite, Bowels costive. Pulse 100.	R Potass. Acet. et Bicarb. aa ʒ ss. ter die. Cathartics pro re nata.
23	60	M.	14 days.	Feet, knees and hands swollen and painful. Tongue with thick yellowish white coat. Appetite good. Bowels regular. Pulse 84.	R Potass. Acet. et Bicarb. aa ʒ ss. ter die.
24	30	F.	7 days.	Pain and swelling of joints of lower extremity. Tongue coated. Considerable thirst. Appetite good. Bowels costive. Pulse 100.	R Potass. Acet. et Bicarb. aa ʒ ss. ter die.
25	24	F.	10 days.	Pain and swelling of all the joints. Tongue lightly coated. Bowels regular. Pulse 76.	R Potass. Acet. et Bicarb. aa ʒ ss. ter die.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Gradual.	25	Nearly well.
Normal.	Became chronic.	50	Well.
Normal.	Gradual.	25	Well.
Normal.	Began at once to improve.	17	Well.
Normal.	Rapid.	22	Well.
Normal.	Gradual improvement.	26	Nearly well.
Normal	Gradual improvement.	12	Well.

No.	Age	Sex	Duration before Admission	Character of Attack on Admission.	Treatment.
26	24	F.	26 days.	No. 25, readmitted, after two days. Pain and swelling of hands and feet.	℞ Potass. Acet. et Bicarb. aa. ʒ ss. ter die for 40 days.
27	22	F.	20 days.	Pain in feet, knees, shoulders and hands. Also, swelling of feet and wrists. Bowels regular. No appetite.	℞ Potass. Acet. et Bicarb. aa. ʒ ss. ter die.
28	48	F.	6 weeks.	Knees, shoulders, and wrists swollen and painful. No redness. Skin cool. Tongue with yellowish white coat. Appetite poor. Pulse 96.	℞ Soda Bicarb. ʒ iss. Potass. Acet. ʒ ii. Aquæ ʒ i. every 3 hours.
29	26	F.	3 weeks.	Ankles swollen and painful. Appetite good. Bowels regular. Skin moist.	℞ Potass. Acet. grs. x. ter die.
30	44	F.	3 weeks.	Pain and swelling of knees, feet, and hands. Bowels regular. Appetite good. Much diaphoresis.	℞ Potass. Acet. et Bicarb. aa. ʒ ss. ter die. 16th day, Potass. Iod. for 1 week. Quinine Sulph. grs. xxiv. Potass. Bicarb. ʒ ss. Tinct. Cardanon ʒ ss. Muc. Acacia ʒ j. Aquæ ʒ xi. ʒ jss. ter die.
31	35	M.	3 days.	Pain in left foot and hand. Bowels regular. Urine normal. Tongue clear and moist.	℞ Sixth day, Potass. Acet. et Bicarb. aa. ʒ ss. ter die.
32	17	M.	2 days.	Pain and swelling of nearly all the joints. Appetite poor. Bowels regular. Tongue with white coat. Resp. 26. Pulse 112.	℞ Potass. Acet. et Bicarb. aa. ʒ ss. 4th day, dose doubled. Tonics substituted on 20th day.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Slow. Pain constantly shifted from joint to joint.	60	Well.
Troubled with palpitation. No murmur.	Rapid.	15	Well.
Normal.	Gradual.	25	Well.
Normal.	Had had rheumatism before. This attack not severe.	18	Well.
Normal.	Very obstinate, with frequent relapses and diarrhoea.	115	Well.
Normal.	Gradual.	40	Well.
Fourth day, first sound intensified. Second sound occasionally reduplicated. Pain in Cardiac region, but no murmur.	Constitutional symptoms severe until fourth day. After that, gradual improvement.	45	Well.

<i>No.</i>	<i>Age</i>	<i>Sex</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
33	37	F.	3 weeks.	Pain, swelling, and redness of left knee. Acid perspiration. Tongue clean and moist. Appetite poor. Bowels regular. Pulse 96.	℞ Potass. Bicarb. ʒj. every 4 hours.
34	26	F.	5 days.	Pain in back and hips. Skin warm. Tongue moist. Appetite poor. Considerable thirst. Catamenia regular, but scanty. Pulse 116.	℞ Potass. Bicarb. ʒij. Pot. Acet. ʒ ij. Pot. Nitr. ʒ ij. Liqr. Am. Acet. ʒviii. ʒ j ter die. Suspended on 8th day.
35	20	M.	4 days.	Right foot red, swollen, and painful. Skin warm and moist. Tongue moist, with creamy coat. Bowels costive.	℞ Potass. Acet. et Bicarb. aa. ʒ ss. every 4 hours. At close of a week, once daily.
36	28	M.	6 days.	Right knee painful, slightly swollen, and red. Pain in shoulder. Skin warm and moist. Tongue with thick, white coat. Pulse 84.	℞ Potass. Acet. et Bicarb. aa. ʒ ss. every 4 hours.
37	30	M.	10 days.	Pain, redness and swelling of knees and ankles. Skin hot and dry. Appetite poor. Bowels costive. Pulse 120.	℞ Potass. Acet. et Bicarb. aa. ʒ ss. every 3 hours. Soda Bicarb. locally.
38	16	M.	3 weeks.	Right wrist and hand red, swollen, and painful. Countenance pale. Skin natural. Tongue clean. Bowels regular. pulse 84. Weak.	℞ For 10 days Vin. Coleh. Then Potass. Rad. gtt. xx. ter die. Potass. Bicarb. ʒij. Pot. Acet. ʒj. Pot. Nit. ʒij. Liqr. Am. Acet. ʒ iv. Acidi Citrici ʒij. Divide into 4 parts. Dissolve 1 powder in Aqua ʒiv, and add ¼ of above mixture. Take every 4 hours. Omitted on 2nd day.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid.	18	Well.
Normal.	Rapid.	13	Well.
Normal.	Rapid.	19	Well.
Normal.	Gradual.	40	Well.
Second day, friction sound. Increased area of dulness on 5th day. 10th day, no friction. Heart normal when dis- charged.	Gradual.	22	Well.
Normal.	Slow.	30	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
39	24	M.	4 days.	Redness, swelling and pain in left knee, right hand and shoulder. Profuse sweating. Tongue with moist white coat. Appetite good. Pulse 100.	℞ Potass. Acet. et Bicarb. aa. ʒ ss. every 4 hours. Omitted after 25 days.
40	30	M.	3 weeks.	Hands and wrists red, swollen and painful. Skin hot and moist. Tongue moist, with thick yellow coat. Pulse 96.	℞ Pot. Acet. et Bicarb. aa. ʒ ss. every 4 hours. Omitted on 3rd day, on account of diarrhoea. Afterwards resumed.
41	18	F.	6 days.	Pain in most of the joints. Skin cool. Tongue slightly coated. Pulse 100.	℞ Pot. Bicarb. Pot. Acet. aa. ʒ ij. ; Pot. Nit. ʒ iij. Liq. Am. Acet. ʒ viij. Acid Citrici ʒ iv. Divide in 4 powders. Dissolve 1 powder in ʒ iv. of water, and add one-fourth of above mixture and take every 4 hours. 13th day, Tonics.
42	45	F.	16 days.	Pain, redness and swelling of feet, ankles and right elbow. Skin warm and moist. Tongue thickly coated. Pulse 100.	℞ Pot. Acet. et Bicarb. ʒ ss. ter die.
43	19	F.	7 days.	Pain in knee and right thumb. Respiration easy. Tongue slightly coated. Appetite good. Bowels regular. Pulse 112.	℞ Pot. Acet. et Bicarb. ʒ ss. every 4 hours. 12th day, Tonics.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Third day, soft systolic souffle at base.	Slow, lingering pain in upper extremity.		
Normal.	Slow.	35	Well.
Normal.	Slow.	40	Well.
Normal.	Rapid.	15	Well.
Normal on admission. 2nd day, slight systolic murmur over aortic valve and transmitted into neck. Less marked when discharged.	Gradual.	25	Well.

<i>No.</i>	<i>Age.</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
44	19	F.	7 days.	Pain, redness and swelling of most of the joints. Skin warm and dry. Tongue clean. Bowels regular. Pulse 80.	R̄ Pot. Acet. et Bicarb. aa. ʒ ss. every 4 hours.
45	18	F.	2 days.	Right knee swollen and painful. Tongue with moist, white coat. No appetite. Bowels costive. Pulse 108.	R̄ Pot. Acet. et Bicarb. aa. ʒ j. Aquæ ʒ viij. ʒss. every 4 hours. Omitted after 4 days.
46	16	F.	2 weeks.	Pain, redness and swelling of knees, ankles and hands. Skin cool and dry. Tongue with brownish coat. Poor appetite. Pulse 96.	R̄ Same as in No. 45. Omitted after 24 days.
47	24	M.	4 weeks.	Pain in knees and shoulder. Skin hot and dry. Tongue clean. Appetite good. Pulse 72.	R̄ Same as in No. 45. Put on Tonics on 10th day. At end of week, Potash resumed.
48	23	M.	9 days.	Ankles and knees painful. Small joints of hands swollen and painful. Skin warm and moist. Tongue red, with white coat. Pulse 100.	R̄ Same as in No. 45. Date of omission not mentioned. Resumed on 28th day.
49	22	F.	9 days.	Ankles, feet and knees swollen. Skin warm and moist. Bowels regular. Tongue coated. Pulse 108.	R̄ Pot. Acet. et Bicarb. aa. ʒ i. Aquæ ʒ viij. ʒ ss. 4 times a day. 20th day diminished one half.
50	40	F.	4 days.	Pain, redness and swelling of joints of lower limbs. Skin warm. Tongue coated. Bowels costive. Pulse 104.	R̄ As in No. 49, for 10 days. Then tonics.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid.	24	Well.
Normal.	Rapid. No pain after 10th day.	27	Well.
Normal.	Rapid. Reported well on 24th day.	28	Well.
Normal.	Gradual, with one relapse.	30	Well.
Third day, distinct murmur after 2nd sound. 5th day, murmur with both sounds. 7th day, sounds more obscure. Slight friction murmur, only with diastole. Area of dulness increased. Bruit with both sounds when discharged.	Fifth day, active delirium followed by coma. Respiration 40. Pulse 112. 7th day, improved. Pain in joints relieved.	90	Nearly well.
Second day, bruit with 1st sound. 14th day, heart intermits every 4th beat. Bruit more distinct.	Slow, with relapse.	40	Well.
Complained of pain in cardiac region for first few days. 5th day, sound muffled. 6th day, bruit with first sound at apex.	Quite rapid. Pain had disappeared in 10 days.	24	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
51	28	M.	12 days.	Pain, with some swelling in hips, knees and ankles. Tongue coated. Appetite poor. Bowels costive. Pulse 84.	R Same as in No. 49. At end of week reduced to three times a day.
52	25	F.	6 days.	Elbows, knees and ankles painful and slightly swollen. Tongue clean. Appetite poor. Bowels costive. Pulse 100.	R Same as in No. 49.
53	30	M.	2 weeks.	Joints of one upper and lower extremity swollen and painful. Tongue thickly coated. Bowels costive. Pulse 104.	R Pot. Acet. et Bicarb. aa ʒss. once in 4 hours.
54	26	F.	4 days.	Pain in left knee, both ankles and shoulders. Left foot swollen. Coated tongue. Appetite poor. Costive bowels. Pulse 84.	R Second day, Pot. Nit. ʒj. ter die.
55	23	M.	8 days.	Left elbow, wrist and knee painful. Right wrist swollen and somewhat painful. Appetite poor. Bowels regular. Pulse 68.	R Pot. Nit. ʒj. ter die.
56	45	M.	13 days.	Nearly all joints painful, red and swollen. Skin natural. Tongue slightly coated. Pulse 104.	R Third day, Pot. Acet. et Bicarb. aa ʒj. every 3 hours. Omitted on the 25th day. Again resumed, and Tonics substituted on 40th day.
57	30	F.	2 weeks.	Joints of lower limbs red, swollen and painful. Tongue with yellowish coat. Bowels regular. Pulse 88.	R Pot. Bicarb. et Acet. aa. ʒi. Aqua ʒviij. ʒss. every 3 hours.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Gradual.	30	Well.
Normal.	Rapid.	14	Well.
Third day, slight prolongation of first sound.	Rapid.	12	Well.
Normal.	Rapid.	9	Well.
Normal on admission. 1st day, slight bellows murmur at apex, with first sound.	Rapid, no pain after 13th day.	20	Well.
Fourth day, slight murmur, with first sound over apex.	Slow, frequent relapses.	60	Nearly well.
Normal.	Rapid.	12	Well.

No.	Age	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
58	26	M.	10 days.	Pain in all joints but left upper extremity. Skin warm and moist. Tongue coated. Appetite poor. Pulse 90.	R Same as No. 57.
59	23	F.	3 weeks.	Both knees and ankles swollen and painful.	R Same as No. 57. Discontinued on 10th day.
60	40	M.	6 days.	Wrist swollen and painful. Appetite poor. Bowels regular. Pulse 68.	R Same as in No. 57.
61	25	M.	2 weeks	Pain in ankle and back. Tongue coated. Bowels regular. Pulse 84.	R Same as in No. 57, ter die.
62	33	F.	2 weeks.	Knees and foot red, swollen and painful. Tongue coated. Appetite poor. Bowels constive. Pulse 112.	R Pot. Acet. et Bicarb. aa. ʒss. Aquæ ʒss. every 4 hours.
63	23	F.	2 weeks.	Pain in feet, knees and back. Left foot swollen and red. Tongue coated. Appetite poor. Bowels regular. Pulse 120.	R As in No. 62, 4 times a day.
64	27	M.	8 days.	Pain in elbow, knee and ankle; latter swollen. Tongue coated. Bowels constive. Pulse 64.	R Pot. Acet. et Bicarb. aa. ʒss. Aquæ ʒss. every 4 hours.
65	22	F.	4 days.	Pain without swelling of joints of right side. Poor appetite. Bowels regular. Pulse 100.	R Pot. Acet. et Bicarb. aa. ʒss. Aquæ ʒss. every 4 hours.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid.	20	Well.
Normal.	Gradual.	30	Well.
Normal.	Gradual.	30	Well.
Normal.	Rapid, no pain after 15th day.	20	Well.
Normal.	Gradual.	30	Well.
Normal.	Rapid, no pain after 6th day.	9	Well.
Normal.	Rapid.	11	Well.
Normal.	Gradual.	22	Well.

No.	Age	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
66	25	F.	8 days.	Pain in joints of left leg and shoulder. Both feet swollen and red. Tongue coated. No appetite. Bowels costive. Pulse 112.	℞ Pot. Acet. et Bicarb. aa. ʒ ss. Six times a day.
67	28	M.	9 days,	Pain in feet, knees, wrists and elbows. Feet and hands swollen. Coated tongue. Poor appetite. Regular bowels. Pulse 84.	℞ Pot. Acet. et Bicarb. aa. ʒ ss. Six times a day.
68	22	M.	1 day.	Discharged 3 days ago. Pains returned yesterday as before. [See No. 65.]	℞ Pot. Acet. et Bicarb. aa. ʒ ss. ter die.
69	17	M.	2 weeks.	Feet, hands and wrists swollen and painful. Tongue coated. Urine high-coloured. Pulse 100.	℞ Pot. Acet. et Bicarb. aa. ʒ j. Aquæ ʒ viij. ʒ ss. quater die. 10th day, tonics. 20th day, alkalies renewed.
70	18	M.	10 days.	Elbows and knees swollen and painful. Skin normal. Tongue moist. pulse 100.	℞ Treatment of No. 69 every 4 hours.
71	17	M.	5 days.	Pain, redness and swelling of knees, feet and ankles. Tongue coated. Pulse 112.	℞ Treatment of No. 69 every 4 hours.
72	22	M.	1 week.	Ankles and wrists painful. Tongue with thick, yellow coat. Poor appetite. Bowels regular. Pulse 92.	℞ Pot. Acet. et Bicarb. ʒ ss. quater die.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid, no pain after 7th day.	14	Well.
Normal.	Rapid.	17	Well.
Normal.	Rapid.	10	Well.
Normal.	Slow, with relapse.	45	Nearly well.
Normal.	Rapid.	19	Well.
On admission, action rapid. Apex beat in 6th intercostal space outside nipple.	Suffered a good deal from dyspnoea. Cyanotic hue of whole body. Died on 5th day.	5	Dead.
Normal.	Rapid.	16	Well.

No.	Age	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
73	20	F.	2 weeks.	Left hand and foot swollen and painful. Tongue with thick, yellow coat. Appetite poor. Bowels regular. Pulse 112.	R Pot. Acet. et Bicarb. aa. ʒss. quater die. Atrophia Sulph. grs. 1 to 50 subcutaneously over ankle 2nd and 3rd day and nights. End of 4 weeks, Pot. Iod.
74	39	M.	1 week.	Most of the joints swollen and red. Tongue natural. Appetite poor. Bowels costive. Pulse 80.	R Pot. Acet. et Bicarb. aa. ʒss. quater die.
*75	21	M.	10 days.	Pain, redness and swelling of all the joints. Tongue clean. Appetite good. Pulse 96.	R Pot. Acet. ʒss. Pot. Bicarb. aa. every 3 hours. Aquæ O j., omitted on 13th day.
76	48	F.	5 days.	Joints of left lower extremity painful and swollen. Tongue coated. Pulse 92.	R Pot. Acet. ʒj. ter die. 10th day, Pot. Iod. ʒj. Pot. Bicarb. gr. xxx. Tinct. Calumbæ ʒi. Aquæ ʒiij. ʒss. every 4 hours.
77	45	M.	5 weeks.	Knees painful and one of them swollen. Tongue with light-brown coat. Appetite poor. Bowels regular. Pulse 88.	R Potass. Acet. ʒj. every 4 hours.
78	23	F.	10 days.	Right hand painful and swollen; pain in feet and knee. Tongue coated. Appetite poor. Bowels regular. Pulse 92.	R Treatment of No. 77.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Slow.	60	Well.
Normal.	Rapid.	16	Well.
Normal.	Rapid No pain after 13th day.	18	Well.
Normal.	Has had many attacks of rheumatism. This one rather slow.	30	Well.
Normal.	Rapid improvement.	11	Well.
Normal on admission. 10th day, systolic murmur loudest over apex. Aortic 2nd sound weakened. Pulmonic intensified. Soufflé softer when discharged.	Gradual.	23	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
79	18	F.	2 weeks.	Pain in shoulders, elbows and toes. Much sweating. Tongue thickly coated. Appetite good. Bowels regular. Pulse 112.	R Pot. Acet. ʒj. every 4 hours. 10th day, but once daily. Pot. Iod. ʒv. ter die.
80	22	M.	5 days.	Pain in knees, hip and shoulders. Poor appetite. Bowels regular. Tongue with creamy coat. Pulse 96.	R Potass. Acet. ʒj. quarter die.
81	22	M.	1 week.	Pain in lower dorsal and lumbar regions. Skin natural. Poor appetite. Tongue clean. Bowels regular. Pulse 90.	R Pot. Acet. ʒss. during the day. Omitted on the 20th day.
82	22	M.	4 weeks.	Knees painful and swollen. Tongue with thin white coat. Appetite poor. Bowels costive. Pulse 80.	R Potass. Acet. ʒj. every 4 hours.
83	37	M.	2 weeks.	Pain and swelling of right knee; pain also in left knee, hips and ankles. Tongue with white coat at centre. Poor appetite. Bowels regular. Pulse 80.	R Potass. Acet. ʒss. quarter die. At close of week, put on tonics.
84	29	F.	2 weeks.	Larger joints of lower extremities painful; some redness and swelling of right knee and wrist. Tongue coated. Appetite poor. Bowels costive. Pulse 108.	R Potass. Acet. ʒj. quarter die.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Gradual.	30	Well.
Normal.	Rapid.	12	Well.
Normal.	Rapid.	20	Well.
Normal.	Rapid.	10	Well.
Normal.	Gradual, with relapse.	30	Well.
Normal on admission. 3rd day, systolic soufflé over base. Improving when discharged.	Had had two attacks of rheumatism. In this one pain was never severe.	25	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
85	19	M.	5 days.	Joints of upper extremity red, painful and swollen Those of lower painful only. Cheeks flushed. Skin hot. Tongue coated. Appetite fair. Pulse 96.	R Potass, Acet. ʒss. during the day. Omitted at end of 4 weeks.
86	28	F.	11 days.	Pain, redness and swelling of ankle. Tongue clean. Appetite good. Bowels costive. Pulse 93.	R Linimentum Aconiti et Chloroformis to knee. 4th day, Pot. Acet. ʒss. quater die. 6th day, reduced to ʒss.
87	22	M.	11 days.	Pain, redness and swelling of ankles and feet. Skin natural. Tongue clear. Appetite good. Pulse 68.	R Pot. Acet. ʒss. during the day.
88	26	M.	5 days.	Pain in foot, shoulder, ankle, elbow and knee. Skin hot. Tongue coated. Appetite poor. Pulse 96.	R Pot. Acet. ʒss. during the day. 10th day, tonics.
89	28	M.	1 week.	Pain and redness of feet. Pain in shoulder. Tongue coated. Skin natural. Appetite poor. Bowels regular. Pulse 84.	R Pot. Acet. ʒss. during the day. 8th day, tonics.
*90	30	M.	1 week.	Pain and swelling of most of the joints. Tongue coated. Bowels regular. Appetite poor. Pulse 92.	R Pot. Acet. Potass. Bi-carb. aa. ʒss. Liq. Am. Acet. Aquæ aa. f. ʒj. every 3 hours.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	No pain, after 4 weeks.	45	Well.
Normal.	Rapid, pain confined to knee throughout.	9	Well.
Normal.	Gradual improvement.	23	Well.
Normal.	Gradually improved.	21	Well.
Normal.	Gradual.	22	Relieved.
Normal on admission. 4th day, apex beat 1½ inches below and outside left nipple. Distinct friction-murmur over whole of cardiac region 12th day, systolic soufflé at apex; friction-sound still continues. Effusion; dulness on percussion.	Continued to suffer much pain for 10 days. 12th day, very weak and delirious. Died on 15th day.	15	Dead.

No.	Sex and Age	Duration of Illness	Character of Attack as Described	Treatment
A	M 25	1 week	Pain and swelling of wrist, shoulder and elbow. Tongue coated. Bowels regular. Appetite poor. Pulse 96.	R Pot. Acet. et Bicarb. aa. ʒss. every 3 days. Unchanged on 8th day.
B	F 25	8 days	Pain and swelling of wrist and elbow. Pain in neck. Bowels good. Bowels inactive. Pulse 94.	R Pot. Acet. ʒss. during the day. 16th day, tonics.
C	M 35	1 week	Pain in elbow and shoulder. Tongue coated. Bowels regular. Bowels inactive. Pulse 98.	R Pot. Acet. ʒss. during the day. 12th day, tonics.
D	M 35	8 days	Pain in hips. Tongue coated. Bowels poor. Bowels regular.	R Pot. Acet. ʒj. every 3 hours.
E	M 35	2 weeks	Pain, redness and swelling of ear, hand and foot. Tongue coated. Bowels inactive.	R Pot. Acet. ʒj 4 times a day. 12th day, tonics.
F	M 35	1 week	Pain, heat and swelling of right foot and ankle. Tongue slightly coated. Appetite good. Bowels regular. Pulse 96.	3 Linimentum Aconiti et Chloroformia. 3rd day, Pot. Acet. ʒj. every 4 hours. 25th day, tonics.
G	M 35	6 days	Pain, redness and swelling of knees and ankles. Tongue slightly coated. Appetite poor. Pulse 98.	R Potam. Acet. ʒj. every 4 hours.
H	F 20	5 days	Left hand and wrist red, swollen and painful. Appetite good. Tongue coated. Bowels regular.	R Pot. Acet. ʒij. Pot. Bicarb. ʒvj. Pot. Nit. ʒiv. Liq. Am. Acet. ʒviij. Mix aa. 3ij. of above, with Acid Citrici ʒj. every 4 hours.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	6th day, much better. Continued to improve.	25	Well.
Normal.	Gradual improvement.	25	Well.
Normal.	18th day, after exposure, had return of pain ; otherwise did well.	30	Well.
Normal.	Pain confined for most part to hips and shoulders. Slow.	45	Well.
On admission, a distinct mitral systolic murmur. 9th day, as distinct as on admission.	Slow. Pain mostly confined to feet.	30	Nearly well.
Normal.	Gradual.	30	Well.
Normal.	Gradually improved, although pain frequently returned.	30	Well.
Normal.	Rapid.	12	Well.

No.	Age	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
99	48	F.	1 month.	Left shoulder, knee, and right elbow painful. Tongue coated. Poor appetite. Bowels constive.	R Potass. Acet. grs. xv. ter die,
100	30	M.	2 weeks	Pain, redness and swelling of knees, right elbow and wrist. Tongue clean. Poor appetite. Bowels constive. Pulse 108.	R Pot. Acet. 3j. every 4 hours. 10th day, omitted. 12th day, again resumed.
101	25	F.	6 days.	Swelling and pain in both ankles. Appetite poor. Tongue coated. Skin moist. Pulse 117.	R Pot. Acet. 3j. every 4 hours.
102	19	M.	6 weeks	Pain in joints of lower extremities. Tongue moist and slightly coated. Appetite fair. Bowels regular.	R Pot. Acet. 3j. every 4 hours.
*103	22	M.	1 week.	Pain, redness and swelling of most of the joints. Countenance flushed. Skin hot, and very moist. Tongue coated. Poor appetite. Pulse 104. Weak.	R Pot. Bicarb. ʒj. Aquæ 3vj. ʒij. every 2 hours. 4th day, omitted. Pot et Sodæ Tartrati ʒss pro re nata. Tinct, Iodine over heart.
104	30	F.	4 days.	Pain in shoulder, hip and knee. Skin dry and cool. Tongue moist and slightly coated. Poor appetite. Pulse 76.	R Liq. Am. Acet. ʒss. Ammon. Carb. grs. x ter die.
105	26	F.	5 days.	Pain in his knees, side, back and feet. Knees somewhat swollen. Cheeks flushed. Skin warm and moist. Tongue coated. Appetite poor. Pulse 116.	R Potass Bicarb. ʒvj. Pot. Acet. ʒij. Pot. Nit. ʒij. Liq. Ammon. Acet. ʒviij. ʒij. of above, with Acidi Citrici ʒj. every 4 hours.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid. Pain had disappeared in 10 days.	12	Well.
Normal.	Gradual, with one relapse.	30	Well.
Normal.	Pain had disappeared in a week. Remained for skin disease, which appeared after admission.	24	Well.
Normal.	Rapid.	15	Well.
On admission. sounds were full and strong. No murmur at any time. 6th day, area of dulness slightly increased. Apex little raised.	Acute symptoms continued until 10 days; then rapidly improved.	21	Well.
Normal.	Rapid.	15	Well.
Normal.	Rapid.	13	Well.

<i>No.</i>	<i>Age.</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
106	31	F.	2 weeks.	Pain in ankles, knees, elbows and shoulders. Feet and left knee swollen. Tongue slightly coated. Good appetite. Bowels regular. Pulse 100.	R Potass. Nit. 3 j. every 3 hours. 15th day, tonics.
107	30	F.	3 days.	Ankles much swollen and painful. Tenderness throughout lower extremities. Skin natural. Bowels regular. Pulse 124.	R Treatment of No. 105. 6th day, Pot. Acet. 3 ss. terdie substituted. Continued 10 days.
108	26	M.	2 weeks.	Both wrists red, painful and swollen. Tongue dry and slightly coated. Good appetite. Bowels regular. Pulse 93.	R Potass. Acet. 3 j. every 4 hours. Omitted on 12th day.
109	31	M.	3 weeks.	Pain in knees and feet on motion. Tongue red and swollen at sides. Appetite good. Bowels regular. Pulse 82.	R Potass. Acet. 3 j. every 4 hours.
110	40	F.	3 weeks.	Pain in right side, increased by inspiration. Some pain between shoulders. Tongue clear. Bowels regular. Pulse 90.	R Wine and beef tea. Jacket poultice to chest. 4th day, Potass. Acet. 5 ss. every 3 hours. 25th day, tonics.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Did very well for 10 days, then pain returned, and improvement was slow.	60	Well.
On admission, distinct friction sound all over cardiac region. 5th day, intense respiring, and accompanied at base with endocardial murmur, obscuring second sound. 13th day, friction sound had almost disappeared.	While in Hospital, complained mostly of pain and distress in cardiac region.	27	Much relieved.
Normal.	Improved gradually.	22	Well.
Normal on admission. 7th day, slight mitral systolic murmur. 11th day, murmur has disappeared. 16th day, both sounds normal.	Slow, pain shifting from joint to joint.	30	Well.
Normal on admission. 5th day, slight increase in area of dulness. Slight bel-lows murmur over pulmonary artery. 26th day, no murmur.	Pain soon extended to limbs, where it long lingered. Also had pulmonary complication and iritis.	60	Well.

No.	Age	Sex.	Duration before Admission.	Character of Attack on Admission.	Treatment.
111	40	F.	3 weeks.	Both ankles and foot red, swollen and painful. Right hand and shoulder also painful. Appetite good. Tongue with brownish coat. Bowels costive. Pulse 96.	R Potass. Acet. ʒij. Pot. Bicarb. ʒvj. Pot. Nit. Div. Liq. Ammon. Acet. ʒviij. ʒij. with Acidi Citrici ʒj. ter die. Omitted on 14th day.
112	26	M.	7 weeks.	Left knee, wrist and ankles very painful, and latter much swollen. Tongue clear. Appetite good. Bowels regular. Pulse 120.	R Same as No. 111. Omitted on 10th day.
113	16	M.	5 weeks.	Pain in left ankle and knee. Some swelling of former. Tongue thinly coated. Appetite fair. Bowels costive. Pulse 90, weak.	R Potass. Acet. ʒj. every 6 hours.
114	25	F.	9 days.	Pain and swelling in the larger joints. Urine highly coloured. Tongue coated. Pulse 96.	R Pot. Acet. ʒij. Aqua Oj. ʒj. ter die.
115	32	M.	5 days.	Great pain in feet, knees and ankles. Tongue with yellowish - white coat. Bowels regular. Pulse 88.	R Sodæ Bicarb. and Potass. Acet. aa. ʒj. ter die.
116	48	M.	5 days.	Pain, swelling and slight redness of knees, hips, hands and arms.	R Pot. Acet. et Bicarb. aa. ʒss. At close of week, diminish one-half.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Pain in lower extremities soon abated. Shoulder continued longer painful.	21	Well.
Normal.	Improved rapidly. No pain after 10th day. Urine then alkaline.	15	Well.
Normal on admission. 17th day, soufflé with first sound of heart. 26th day, had disappeared.	Rather slow.	36	Well.
On admission, systolic and diastolic soufflé over the heart, loudest at apex. 8th day, diastolic soufflé, loudest at base. When discharged, sharp systolic soufflé, loudest over apex.	Slow.	45	Well.
Normal.	Rapid.	14	Well.
Normal.	Obstinate pain continually returning.	60	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
117	21	F.	1 week.	Pain, redness and swelling of nearly all joints. Tongue thickly coated. No appetite. Much thirst. Bowels costive.	R Pot. Bicarb. 5ss. every 4 hours. 8th day, tonics 22nd day, Potass. resumed.
118	45	M.	4 days.	Pain, redness and swelling of left foot. Bowels costive.	R Bi-carb. Potass. Acet. Potass aa. 5ss. every 3 hours.
119	20	M.	15 days.	Pain, redness and swelling in ankles and knees. Appetite poor. Bowels costive. Slight palpitation.	R Pot. Bicarb Pot. Acet. aa. 5ss. every 3 hours.
120	35	M	47 days.	Pain, redness and swelling of nearly all the joints. Anorexia. Bowels regular.	R Pot. Acet. et Potass. Bicarb. 5ss. every 3 hours.
121	45	M.	1 day.	Pain, redness and swelling of foot and wrist. Urine highly coloured. Bowels costive.	R Pot. Acet. Pot. Nit. Pot. Bicarb. Liqr. Am. Acet. 5j. aa. 3ss. every 3 hours.
122	50	F.	28 days	Pain and swelling of various joints. Bowels costive	R Pot. Acet Potass. Bi-carb Sodæ Bicarb, aa. 5ss. every 3 hours.
123	52	F.	4 days.	Pain and swelling of wrist and knee.	R Pot. Acet et Bicarb. 5ss. every 3 hours.
124	25	M.	18 days.	Pain in hips, knees and shoulders. Slight redness and swelling. Regular bowels. Urine highly coloured.	R Pot. Acet. 5j. ter die. followed by tonics.
125	23	M.	2 weeks.	Both wrists red, painful and swollen. Pain in small of back. Feet painful, though not swollen. Soreness in left side of chest Tongue with thick white coat. No appetite. Bowels loose.	R Pot. Bicarb. 5vj. Pot. Acetate 5ij. Pot. Nit. ʒiv. Liqr. Ammon. Acetate 5viij. 5ij. ter die with Citric Acid ʒj.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Third day, area of dulness doubled. Extends outside the nipple. No murmur.	Rapid.	11	Well.
Normal.	No complications.	12	Well.
Mitral systolic murmur. Heart trouble dates back five years.	Rapid.	19	Well.
Normal.	No complication.	10	Well.
Normal.	No complication.	35	Well.
Normal.	No complication.	16	Well.
Normal.	No complication.	57	Well.
Normal.	Slight attack of diarrhoea.	35	Well.
Normal.	No redness or swelling 8 days after entrance.	16	Well.

APPENDIX.—PART II.

NON-ALKALINE TREATMENT.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
1	47	F.	3 weeks.	Pains in all the joints. Skin warm. Tongue clean. Appetite poor. Complains also of cough.	R Potass. Brom. gr. v. at night. Expectorant mixture. 8th day, tonics.
2	50	F.	2 weeks.	Pain in all the joints except ankles. Tongue clean and moist. Skin cool. Bowels costive. Pulse 78.	R Lin. Ammoniae to joints. 7th day. Tinct. Iodini to knee. 10th day, tonics.
3	18	F.	1 week.	Left foot and knee painful. Skin cool. Tongue natural. Appetite variable. Pulse 118.	R Joints sprinkled with sulphur. Pulv. Colch. grs. iij. Pulv. Ipecac. Co. grs. v. Night and morning. 11th day Inf. Gentianae ʒ viij. Tinct. Gent. Co. ʒ j. ʒ ss. ter die.
4	22	F.	6 weeks.	Pain in ankles and knees. Moist skin. Tongue clean. Appetite good. Bowels regular. Pulse 84.	R Podophyllamiae gr. i. Aquae Menth. Pip. ʒiv. Sacch. Albi. ʒij. 14th day, tonics.
5	19	F.	3 weeks.	Knees swollen and painful. Tongue coated. Skin warm. Pulse 96.	R Tela Vesicator followed by poultice. 7th day, Calcis Chloridi Spt. Vini Gallici. aa. ʒ ss. every 3 hours. 21st day, Pot. Iod.
6	24	F.	8 weeks.	Pain in knees, ankles, wrists and shoulders. Bowels regular. Appetite poor.	R Sulphur and cotton batting to joints. 12th day, Vin. Colch. Rad. gtt. xij. 16th day, Propylamiae gtt. xxxij. Syrup. Simplex ʒvss. Aquae Menth. Pip. ʒ ss. every 2 hours.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid. Complained mostly of cough.	15	Well.
Normal.	After 17th day, pain in knee only.	38	Well.
Normal.	Slow.	40	Well.
Normal.	Slow.	46	Well.
Normal.	Before admission had suf- fered from rheumatism. While in hospital seemed to suffer from some other obscure disease.	23	Dead.
Normal.	For over a week vomited nearly everything taken. Attacks of vomiting at times afterwards. Did not complain of rheuma- tism.	30	Well.

No.	Age	Sex	Duration before Admission	Character of Attack on Admission.	Treatment.
7	24	F.	8 days.	Stiffness in joints. No swelling. Tongue clean. Appetite poor. Bowels regular. Tongue with creamy coat. Pulse 96.	R Pot. Acet. ʒj. every 4 hours. 17th day, Pot. Iodi. gr. v. ter die.
8	26	M.	1 week.	Pain, redness and swelling of knee. Natural skin. Tongue with thick white coat. Appetite poor. Bowels loose. Pulse 80.	Pot. Bicarb. ʒvj. Pot. Acet. ʒij. Pot. Nit. ʒiv. Liqr. Ammon. Acet. ʒviij. One-fourth of above, with Acidi Citrici ʒj. every 4 hours. Omitted next day. 15th day, R Vin. Colch. ʒss. Pot. Iod. ʒiss. Tinct. Opii. ʒj. gtt. xx. ter die. 23rd day, substituted the following: R Spt. Æther Nit. ʒss. Pot. Nit. grs. v. Muci. Acaciae Aquæ aa. ʒvj. ʒj. every 3 hours. In 5 days resumed treatment of 15th day.
9	25	M	1 day.	Pain and swelling of right wrist. Tongue natural. Appetite good. Sleeps poorly. Pulse 64.	R Pot. Acet. et Bicarb. aa. ʒss. 4 times a day. Painful parts rubbed with Tinct. Opii, and wrapped in flannel. 16th day, Pot. Iod. gr. v. ter die. 21st day, Tinct. Guaiaci. Am. ʒj. ter die. 26th day, Syrup. Phos. Trip. ʒj. ter die.
10	38	M.	2 weeks	Pain, with slight swelling and redness of hips, knees and ankles. Tongue coated. Appetite poor. Bowels constive. Pulse 100.	R Pot. Acet. ʒj. ter die. Painful parts wrapped in flannel and sulphur. 14th day, Tinct. Guaiaci. Ammon. ʒj. ter die. 29th day, tonics.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal on admission. 8th day, aortic sys- tolic soufflé. 22nd day, had diminished.	Slow. Suffered from gene- ral stiffness, but no acute pain.	40	Well.
Normal.	Very slow, pain confined to knee for most part.	45	Well.
Normal.	Slow	34	Well.
Normal.	Began to improve on the 19th day. Then progressed rapidly.	45	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
11	19	M.	1 week.	Pain in feet, knees and wrist. Tongue clean. Appetite poor. Bowels regular. Pulse 96.	R Pot. Acet. ʒj. ter die. 3rd day, Tinct. Digitalis gtt. vj. every 3 hours. Acetate omitted 8th day. Pot. Iod. ʒj. Pot. Bicarb. ʒss. Tinct. Calumb. ʒj. Aquæ ʒiij. ʒss. every 4 hours.
12	23	M.	3 weeks.	Pain in knee and elbow. Tongue slightly coated. Bowels costive. Pulse 96.	Local treatment only.
13	22	F.	6 weeks.	Knees and ankles somewhat swollen and painful. Skin natural. Tongue coated. Pulse 108.	R Pot. Bicarb. Pot. Acet. aa. ʒj. Aqua ʒviij. At end of week put on Pot. Iod. grs. vj. ʒss. ter die.
14	26	M.	3 weeks.	Pain and swelling of feet and knees. Tongue clean. Appetite good. Pulse 72.	R Pot. Iod. gr. v. ter die. 16th day, Tinct. Guaiac. Ammon. ʒj. substituted. 22nd day, Iodide resumed. 40th day. Propylamiæ gtt. xxxvj. Liqr. Potassæ ʒvj. Sacch. Albi ʒij. Aquæ Menth. Pip. ʒvj. ʒss. ter die.
15	26	M.	4 months	Knees swollen and painful. Appetite good. Bowels regular.	R Potass. Iod. 7th day, Vin. Colch. Rad. gtt. xv. quater die. 10th day, Iodide omitted, but resumed on the 12th day. End of month, Quinine for a few days only.
16	56	M.	3 weeks.	Pain and swelling of joints of right hand. Appetite and sleep good. Bowels regular. Pulse 84.	R Hot poppy fomentations to wrist. 6th day, Quinine.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal on admission. 3rd day Soufflé with first sound over base. Soufflé had disappeared when discharged. Second sound prolonged.	Rapid.	15	Well.
Normal.	Rapid.	10	Well.
8th day, soft systolic soufflé with first sound.	Gradual. After pain had subsided, stiffness lingered for some time in ankles.	30	Nearly well.
Normal.	Very slow.	70	Relieved.
Normal.	Gradually improved. Pain did not extend beyond knees. No record after first month.	60	Well.
Normal.	Rapid improvement in rheumatism. Detained for ulcer of leg.	30	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
17	51	M.	1 week.	Pain in knees. Tongue clean and moist. Appetite poor. Bowels regular. Pulse 84.	℞ Potass. Iod. grs. v. quater die.
18	29	F.	3 weeks.	Pain, redness and swelling of calves of legs. Skin natural. Tongue clean. Pulse 96.	℞ Hot poppy fomentations. Potass. Iod. grs. v. ter die.
19	10	F.	10 days.	Severe pain in back. Bowels regular. Appetite good.	℞ Pot. Iod. grs. v.
20	21	F.	2 weeks.	Pain, redness and swelling of wrist and shoulder. Tongue moist, with thin white coat. Pulse 108.	℞ Pot. Iod. grs. v. ter die. 5th day, omitted.
21	15	F.	6 weeks.	Pain and swelling of elbows, shoulders, knees, and hands. Appetite good. Bowels regular. Sleeps well. Pulse 96.	℞ Pot. Iod. grs. v. ter die. 8th day, Vin. Colch. Rad. gtt. viij. substituted.
22	46	M.	5 weeks.	Pain in lower third of tibia, at times shooting up to knees. Skin warm and moist. Tongue dry. Some thirst. Appetite poor. Pulse 72.	℞ Pot. Iod. grs. vi. Tinct. Gent. ʒij. Syrup Zing. ʒss. ter die.
23	27	M.	1 week.	Pain in hips and muscles of thighs. Appetite fair. Tongue moist, with brownish coat at centre.	℞ Pulv. Colch. Rad. grs. iv. Pulv. Ip. et Opii grs. v. Sodæ et Pot. Tart. ʒss. 4 times a days.
24	30	M.	5 weeks.	Pain in back, shoulders and wrists. Skin natural. Tongue slightly coated. Appetite fair. Pulse 60.	As above. Omitted after 3 days. End of month, ℞ Pot. Iod. grs. vi. Gent. Inf. Comp ʒj. ter die.

<i>State of Heart Throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Gradual improvement.	30	Well.
Normal.	Gradual improvement.	25	Well.
Normal.	Slowly improved.	30	Well.
Normal.	Quite rapid. No pain after a week.	12	Well.
Normal.	Slowly improved.	35	Well.
Normal.	Rapid.	8	Well.
Normal.	Rapid.	6	Well.
Normal.	Slowly improved, but had occasional return of pain.	40	Well.

<i>No.</i>	<i>Age.</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
25	24	F.	3 weeks.	Knees and wrists red, painful and swollen. Tongue dry, with brownish coat. No appetite. Bowels regular. Pulse 110.	R Pulv. Colch. Rad. grs. iv. Pulv. Ipec. et Opii grs. v. Sodæ et Pot. Tart. 5j. ter die. 9th day, Quin. Sulph. gr. i. ter die substituted.
26	27	F.	3 weeks.	Pain, redness and swelling of wrists and ankles. Skin natural. Appetite poor. Tongue clean. Pulse 84.	R Pulv. Colch. Rad. grs. iv. Pulv. Ip. et Opii grs. v. Sodæ et Pot. Tart. 5ss. Sodæ Bicarb. 3ss. Inf. Lini Sem. Oj. every 4 hours as a drink. Latter omitted on 7th day. Gent. Inf. Co. 5j.
27	30	M.	5 days.	Pain in most of the joints. No appetite. Great thirst. Skin normal. Urine scanty and high coloured. Pulse 96, intermitting at every fourth beat.	R Pulv. Colch. Rad. grs. iv. Pulv. Ipec. et Opi. grs. v. Sodæ et Pot. Tart. 5ss. Sodæ Bicarb. 3ss. Inf. Lini Sem. Oj. every 4 hours during the day. 4th day, first medicine reduced to every 6 hours. 8th day, every 4 hours again.
28	21	M.	4 days.	Pain in arms, hands and feet. Skin warm and moist. Tongue dry with white coat. No appetite. Bowels costive.	R Pulv. Colch Rad. grs. iv. Pulv. Ip. et Opi. grs. v. Sodæ et Pot. Tart. 5ss. 4 times a day 13th day, reduced one-half. 20th day, Potass. Iod.
29	34	M.	2 weeks.	Pain, redness, and swelling of ankles, knees, wrists and elbows. Skin hot and dry. Tongue dry, with thick white coat.	R Pulv. Coch. Rad. grs. iv. Pulv. Ip. et Opi. grs. v. Sodæ et Pot. Tart. 5ss. every 4 hours. 9th day omitted. Pot. Acet. for 3 days. Then Vin. Colch. gtt. xv. 14 days. Increased to gtt. xx. 18 days. Alkalies continued for 10 days. Also Quinine.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Suffered scarcely any pain after two weeks.	25	Well.
Normal.	Inflammatory symptoms were worse before admission. Slowly improved while in hospital.	30	Well.
Complained of palpitation on admission. Apex beat slightly displaced outwards. No murmur at any time.	Much better on 5th day. Return of pain to shoulders on 8th day. After that continued to improve.	30	Well.
On admission, systolic murmur more marked at base than apex.	Improved rapidly first few days. Had occasional return of pains during first month.	60	Well.
Normal.	Gradually improved.	28	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
30	30	M.	1 month.	Joints of hand and shoulder painful, red and swollen. Skin natural. Tongue dry, with brownish coat. Considerable thirst. Pulse 52.	R. Poppy fomentation. Tinct. Cinchonæ Co. 5ij. twice daily.
31	23	F.	2 weeks.	Slight stiffness in right arm. Bowels regular. Urine normal. Pulse 92, small and feeble.	R. Pot. Iod. grs. v. ter die. 3rd day, Syrupi Calcis gtt. xx. substituted. After 10 days, put on tonics.
32	22	M.	9 days.	Pain in wrist, back and shoulders. Redness and swelling of wrists and ankles. Tongue coated. Appetite poor. Bowels costive. Pulse 88.	R. Syrupi Calcis gtt. xx. every hour. Omitted on 12th day Potass. Permang. grs. ss. ter die. 25th day, Iodide substituted.
33	33	M.	2 weeks.	Pain in back, elbows, wrists and knees. No appetite. Bowels regular.	R. Pot. Iod. grs. v. ter die. 3rd day, increased to every 4th hour. 5th day, Syrupi Calcis gtt. xx. hourly in addition.
34	30	F.	1 week.	Knees and ankles red, swollen and painful. Appetite poor. Urine high coloured. Pulse 94.	4th day, R. Syrupi Calcis gtt. xx. hourly

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Began to improve at once, and progressed gradually. No record after 1st month.	60	Well.
On admission, cardiac dulness extended upwards to 2nd rib, and outwards 2 inches to left of median line. Soufflé with first sound, most distinct at apex.	Had suffered worst of her disease before admission. Continued to improve while in hospital.	18	Well.
On admission, soufflé with first sound at apex. 25th day, area of dulness extended from right edge of sternum to a line extending through left nipple. Soft soufflé obscuring first and second sounds over base. Same when discharged.	Slow.	58	Well.
Normal.	Rapid, no pain after 10th day.	14	Well.
5th day, systolic soufflé at apex.	Rapid.	12	Well.

Case No.	Age	Duration	Symptoms & Signs	Treatment
3	1	1 month	Swelling and pain in neck. Irritability. Increase in weight.	3 Syrupi Calcis grt. xx hourly for 3 days. Then Potassa Permang. gr. ss ter die for 3 days. Then same.
5	3	2 days	Pain and some swelling in shoulder, arm and leg. Neck not stiff more. Tongue thickly coated. Pulse 144.	3 Pulv. Ipec. Comp. pro re nata. Tinct. Iodini. Diet of marsh, berries, and Elixir Guine. Am. T. ter die.
7	5	1 month	Pain and swelling of neck. Neck and in shoulder not stiff. Tongue coated. Bowels regular. No appetite. Pulse 112.	3 Vin. Colch. Rad. grt. ii. every 4 hours. B. Quin. grs. ij. Pot. Bicarb. grs. xxx. Mac. Licious. Jm. Jm. every 4 hours. 10th day. Potassa Iod. grs. v. ter die.
9	7	3 days	Swelling and pain in neck & the wrist. Irritability. Incontinence. Appetite poor. Bowels regular.	3 Pulv. Colch. Rad. grs. xx. Pulv. Ix. et Opi. grs. v. Sod. et Pot. Tart. Jm. 6th day, reduced to 3 times a day.
12	8	2 days	Pain in shoulder, elbow, wrist and ankles. Neck stiff and more. Appetite poor. Thirst increased. Bowels regular. Pulse 144.	3 Mac. Sulph. Jm. Sod. Bicarb. Jm. Vin. Colch. Rad. Jm. Aquae Jiv. Jm. every 6 hours 10th day. B. Syrupi Calcis grt. xx. every 2 hours.
40	30	5 weeks	Pain and swelling of wrist. Appetite fair. Bowels regular. Tongue moist and slightly reddened. Pulse 144.	B. Potassa Iod. grs. v. ter die.
41	30	1 month	Pain and stiffness in back. Was in hospital for acute rheumatism, and discharged 5 weeks ago. Bowels regular.	B. Pot. Iod. grs. v. ter die. Cotton batting and sulphur to back.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	While in hospital had an attack of bronchitis, which had not entirely disappeared when discharged.	40	Well.
Normal on admission. 14th day, friction sound first heard. 7th day, area of dulness increased.	Very slow. In early part complicated with bronchitis.	130	Well.
Normal.	Quite rapid. Well on 22nd day.	28	Well.
Normal.	Rapid.	14	Well.
Normal.	Gradual.	35	Well.
Normal.	Subacute throughout.	16	Well.
Normal.	Symptoms not severe at any time.	22	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
42	15	M.	3 weeks.	Pains in back, feet and knees. Skin cool and moist. Tongue clean. Appetite poor. Thirst urgent.	R̄ Tinct. Ferri. Mur gtt. viij. 3 times a day. Tinct. Iodini locally.
43	22	F.	3 weeks.	Hands and wrists swollen, red and painful. Skin warm and moist. Tongue slightly coated. Pulse 80.	R̄ Pot. Iod. grs. v. ter die.
44	14	F.	2 weeks.	Pain, redness and swelling of knees and feet. Tongue moist and slightly coated. Appetite good. Bowels regular. Pulse 80.	R̄ Pot. Iod. grs. iij. ter die. Omitted at end of month. 35th day, Tinct. Guaiac. Am. gtt. xv ter die.
45	19	F.	4 days.	Pain in arms and feet. Tongue clean. Bowels costive. Catamenia regular. Pulse 96.	R̄ Pot. Iod. grs. v. ter d'e, 5th day, Syrupi Calcis. gtt. xx. ter die substituted. On 6th day of use, doubled. Three weeks after admission, Iodide resumed.
46	19	F.	1 week.	Pain and slight swelling of feet and hands. Skin moist. Tongue with brownish coat. Costive bowels. Pulse 88.	R̄ Potass Iod grs. v. ter die.
47	35	M.	4 days.	Pain and redness of foot. Tongue slightly coated. Poor appetite.	R̄ Potass. Iod. grs. v. ter die.
*48	24	F.	1 week.	Pain in right ankle, knee and shoulders. Tongue with brownish coat. Pulse 88.	R̄ Pot. Iod. grs. v. ter die.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
On admission, aortic regurgitant mur- mur. Complained of palpitation.	A mild attack.	30	Well.
Normal.	Rapid.	17	Well.
Normal.	Pain settled in right knee. Very slow.	70	Well.
Normal	Slow.	40	Well.
On admission, soufflé with systole loudest over apex.	No pain after 2 weeks.	30	Well.
Normal.	A mild attack.	16	Well.
Normal.	Very rapid.	6	Well.

<i>No.</i>	<i>Age</i>	<i>Sex</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
49	24	M.	3 weeks.	Pain, redness and swelling of most of the joints. Tongue clean and moist. Appetite poor. Bowels costive. Pulse 76.	R Pulv Ipeac Comp grs. v. ter die. 7th day, Pot. Iod. grs v. Vin Colch, Rad. gtt. x. ter die.
50	49	M.	6 weeks.	Pain and redness of knees, hips ankles and shoulders. Natural expression Skin cool and moist Appetite good. Bowels regular. Pulse 80.	R Pot. Iod. grs. v. Vin. Colch. Rad. m. xv. Colch. increased to m. xv. on 9th day. 25th day, tonics substituted ter die.
*51	31	F.	10 weeks	Pain in both hips. Appetite poor. Bowels costive. Pulse 92 Irregular.	R Pot. Iod. grs. v. Vin. Colch. Rad. m. x. ter die. Tinct. Iodini over cardiac region.
52	43	F.	4 weeks.	Severe pains in back and limbs. Right and left hand swollen and painful. Tongue with white coat. Bowels costive. Pulse 104.	R Pot. Nit. 3ss. Spt. Æthris Nit. 3ij. Liqr. Amm., Acet. Aquæ Camphor aa. 3ij. 5j. every 2 hours. Tinct. Opii., Sod. Bicarb. aa. 3j. Aquæ O ss. Applied to joints.
53	44	M.	1 month.	Knee and shoulder painful and swollen. Skin warm and moist. Tongue slightly coated. Appetite fair. Pulse 84.	R Pot. Iod. grs. v. ter die. Ol. Morrhuæ, Spt. Frumenti aa. 3ij. Spt. Lavand. Co. 5iv. 3ij. ter die. 40th day, Pot. Acet. et Pot. Bicarb. aa. 3ss. Aquæ 3ss. Every 4 hours, for 10 days.
*54	19	M.	10 days.	Left ankle red, swollen and painful. Skin moist. Tongue moist and slightly coated. Appetite good. Pulse 92. Has symptoms of specific disease.	R Pot. Iod 3iij. Aquæ 3iv. 3j. ter die. Pot. Iod. 3iij. Aquæ 3iv. 5j. ter die.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Complained of headache a good deal, and pain in epigastrium.	30	Nearly well.
Normal.	Subacute, but slow.	40	Well.
Pain in cardiac region on admission. No murmur throughout.	Severity of attack has passed before admission. No pain after 12th day.	30	Well.
Normal.	Rapid.	17	Well.
Normal.	Rapid.	17	Well.
Normal.	Rapid.	5	Well.

No.	Age	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
55	30	M.	4 months.	Pain in joints, particularly at night. Skin moist and slightly warm. Pulse 12. Appetite poor. Bowels costive.	R Syrapi Calcis gtt. xx. every 2 hours for 5 days. Pot. Acet. et Pot. Bicarb. aa. ʒ j. for 2 weeks, beginning with the 5th day.
56	25	M.	9 days.	Pain in joints of arm and in one ankle. Skin warm and moist. Tongue clean. Pulse 76.	R Syrapi Calcis gtt. xx. every 2 hours. After 3rd day, every 4 hours.
57	16	M.	5 days.	Pain, redness and swelling of right knee, ankles and feet. Pulse 84. Tongue clean. Skin warm and moist. Urine normal.	R Syrapi Calcis gtt. xx. every 2 hours.
58	25	F.	6 days.	Pain, redness and swelling of several joints. Skin warm and moist. Tongue with yellowish pasty coat. Appetite poor. Pulse 128. Weak.	R Syrapi Calcis gtt. xx. every 3 hours.
*59	16	M.	1 day.	Ankles red, painful and swollen. Tongue clear. Appetite good. Bowels regular.	R Syrapi Calcis gtt. xx. every 2 hours.
60	19	F.	6 weeks.	Pain, swelling and redness of several joints. Skin warm, with acid perspiration. Tongue coated. Appetite poor. Bowels costive.	R Syrapi Calcis gtt. xx. every 2 hours. After 8th day, every 4 hours. 6 days later, put on tonics.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal on admission. 3rd day. harsh grating, with systolic most distinct at apex. Heart normal when discharged.	Gradual.	35	Much relieved.
Normal.	Rapid.	13	Well.
Normal.	Very rapid.	7	Well.
Rapid on admission but no murmur. 9th day, loud systolic soufflé, most distinct at apex. No murmur along aorta. Much diminished, but still perceptible, when discharged.	Rapid.	13	Well.
Normal.	Rapid.	18	Well.
Normal.	Rather slow. Pains inclined to return in several joints.	30	Much relieved.

<i>No.</i>	<i>Age</i>	<i>Sex</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
61	15	F.	6 days.	Pain, redness and swelling of knees, ankles and elbows. Skin natural. Tongue clean. Pulse 80. No appetite. Bowels costive.	R Syrupi Calcis gtt. xv. every 2 hours.
62	—	F.	—	Various joints swollen, red and painful. Skin hot and moist, with acid perspiration. Tongue with white coat. Pulse and respiration regular. No appetite. Bowels costive.	R Syrupi Calcis gtt. xx. every 2 hours.
*63	52	M.	1 month.	Calves of both legs swollen and painful. Face flushed. Skin dry. Tongue moist and slightly coated. Appetite poor. Bowels regular. Pulse 72.	R Tinct. Guaiac Am. 3j. ter die.
64	32	M.	10 days.	Pain in foot and popliteal region. Tongue moist and slightly coated. Appetite poor. Bowels regular. Pulse 96.	R Pot Iod. 3ij. Aquæ 3iv. 3j. ter die.
65	60	M.	7 weeks.	Pain in feet, ankle and hand. Skin natural. Tongue clean. Appetite fair. Bowels regular. Pulse 64.	R Inf. Calumbæ 3ij. Tinct. Calumbæ 3ij ter die.
66	35	M.	5 weeks.	Pain in hands and feet. Tongue clean. Appetite fair. Pulse 88.	R Pot Iod. grs. v. Vin. Colch. gtt xx. ter die. Cold douche locally.
67	34	M.	13 days.	Pain in lumbar region, shooting up towards shoulders. Skin warm and moist. Tongue moist, with thin white coat. Appetite feeble. Bowels costive. Pulse 80.	R Syrup. Phos. Trip. 3j. ter die.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid.	20	Well.
Normal.	Rapid.	20	Well.
Normal.	Rapid.	13	Well.
Normal.	Rapid.	3	Improved.
Normal.	Severity of attack had passed before admission. In hospital improved rapidly.	13	Well.
Normal.	Gradual.	30	Well.
On admission, distinct soufflé following systole. Not perceptible when discharged.	Gradual.	20	Improved.

No.	Age	Sex	Duration before Admission	Character of Attack on Admission.	Treatment.
68	35	M.	8 days.	Pain in back. Aspect good. Skin warm and dry. Tongue moist and slightly coated. Bowels costive. Pulse 72.	R̄ Hot fomentations. Dover's powders pro renata.
*69	18	M.	4 weeks.	Pain, redness and swelling of ankles, knees and wrists. Skin cool and moist. Tongue coated. Bowels regular. Pulse 80.	R̄ Tinct. Guaiac Ammon. ʒj. ter die. Omitted on 25th day.
70	49	M.	4 weeks.	Slight pain and swelling of knees and ankles. Tongue clean Appetite fair. Bowels costive. Pulse 88.	R̄ Tinct. Saponis et Opii. to joints. Quin. Sulph. grs. i. ter die.
71	22	F.	6 weeks.	Pain in leg, arm and chest. Tongue natural. Appetite fair. Bowels costive. Pulse 84.	R̄ Pot. Iod. grs. v. ter die.
*72	24	F.	19 days.	Pain in knees, back and shoulder. Bowels regular. Appetite fair. Tongue clean. Pulse 56.	R̄ Tinct. Aconiti Rad. Chloroformis aa. ʒj. Alcohol ʒij. Applied to painful parts.
73	50	M.	4 weeks.	Pain in ankles and calves of legs. Respiration easy. Tongue clean and moist. Pulse 50.	R̄ Pulv. Colch. Sem. grs. viij. Pulv. Ipecac. et Opii. grs. x hourly. 12th day, tonics.
74	27	F.	1 week.	Tenderness on pressure in feet. Tongue red. Bowels costive. Respiration easy. Pulse 100.	R̄ Pulv. Colch. Sem. grs. ij. Pulv. Ipecac. et Opii. grs. viij. hourly. Tinct. Iodini to soles of feet.
*75	31	F.	2 weeks.	Pain in legs, which are swollen and red about the ankles. Tongue normal. Appetite poor. Bowels regular. Pulse 64.	R̄ Atrophine Sulph. grs. 1-60 subcutaneously.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Soon relieved of pain.	7	Relieved.
Normal on admission 18th day, bruit heard with first sound at apex, with second sound at base. Same when discharged.	Began to improve at once. No pain after 25th day.	40	Well.
Normal	Rapid.	16	Well.
Normal.	Rapid.	10	Well.
Normal.	Began to improve.	4	Relieved.
Normal.	Soon relieved of pain, but stiffness remained in joints.	40	Well.
Normal.	Steadily improved.	12	Nearly well.
Normal.	Pain nearly relieved by Atropia.	7	Nearly well.

<i>No.</i>	<i>Age</i>	<i>Sex</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
76	50	F.	6 weeks.	Headache and pain in shoulder. Tongue with thick yellow coat. Appetite poor. Bowels constive. Pulse 84.	℞ Laxatives pro re nata.
77	15	F.	4 days.	Right hand and foot painful and a little swollen. Tongue natural. Appetite poor. Bowels constive. Pulse 56.	℞ Atrophine Sulph. grs. 1-60, subcutantaneously at wrist. Repeated on 4th day.
78	*20	M.	2 months.	Severe pains in feet. Bowels regular. Appetite good. Tongue clean and moist. Pulse 88.	℞ Iodini ʒj. Ether Sulph. ʒj. Applied to feet.
79	22	M.	3 days.	Pain on motion in shoulders and thighs. Intelligence good. Tongue slightly coated. Skin natural. Bowels constive. Pulse 64.	℞ Potass. Iod. grs. v. ter die.
80	68	F.	3 weeks.	Pain in whole of right arm and hand. Tongue natural. Appetite fair. Bowels regular. Pulse 92.	℞ Quin. Sulph. grs. i. ter die. 7th day, Tinct. Guaiac. Amm. ʒj. ter die. 24th day, substituted ℞ Pot. Iod. grs. v. Vini. Colch. gtt. x. ter die.
81	45	F.	1 month.	Right foot little swollen and somewhat painful. Tongue slightly coated. Appetite poor. Bowels regular. Pulse 92.	℞ Tinct. Guaiac. Am. ʒj. ter die.
82	29	M.	4 weeks.	Pain in back, hip and foot. Tongue clean. Appetite poor. Bowels regular. Sleeps poorly. Pulse 60.	℞ Tinct. Ferri Chloridi. 7th day, Syrup. Triple Phos. ʒj. ter die.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Severity of attack had passed before admission. Complained chiefly of headache.	12	Relieved.
Normal.	Rapid.	15	Well.
Normal.	Nearly relieved from pain at once.	18	Nearly well.
Normal.	Rapid.	6	Much relieved.
Normal.	Gradual improvement.	30	Well.
Normal.	Gradual improvement.	30	Well.
Normal.	Gradual.	17	Relieved.

<i>No</i>	<i>Age</i>	<i>Sex</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
83	22	M.	40 days.	Ankle swollen and painful. Skin natural. Tongue with yellowish coat. Appetite good. Bowels regular. Pulse 100.	℞ Vin. Colch. Rad. gtt. xij. every 2 hours. 4th day, Propylaminæ m. xxiv. Aquæ Menth. Pip. ʒij. Syrup. Simplex ʒiv. ʒss. every 2 hours, instead of Colchicum. End of 2 months, ℞ Pot. Iod. grs. v. ter die.
*84	30	M.	2 months.	Two months ago, when lifting heavy load, felt sudden, sharp pain in back. Has had several attacks like this. Acute pain now on attempting to raise himself. Tongue natural. Appetite good. Bowels regular. Pulse 68.	℞ Pot. Iod. grs. v. ter die. Tinct. Cantharides, ʒj. Lin. Saponis ʒiij applied to painful parts.
85	45	F.	4 days	Pain in ankle. Tongue natural. Appetite good. Bowels regular. Pulse 88.	℞ Tinct. Guaiac. Amm. ʒj. ter die.
*86	27	F	3 weeks.	Pain and tenderness in shoulder, extending into arm. Intelligence good. Skin cool. Tongue pale but clean. Bowels costive. Pulse 88.	℞ Pulv. Ipec. et Opii. grs. v. hourly for 1st day.
87	46	M	10 days.	Pain and swelling in ankle, wrist and elbow. Intelligence good. Skin natural. Bowels regular. Pulse 88.	℞ Vin. Colch. Rad. gtt. xv. ter die.
88	19	M.	6 weeks.	Pain, redness and swelling of knee and ankles. Skin natural. Bowels regular. Pulse 104.	℞ Vin. Colch. Rad. ʒss. Pot. Iod. ʒij. gtt. xv. ter die.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Very slow Pain confined to ankle.	70	Much relieved.
Normal.	Rapidly improved.	15	Well.
Normal.	Gradual.	30	Well.
Normal.	Rapid.	14	Well.
Normal	Slow.	40	Well.
Normal	Slow, with relapses.	60	Well.

No.	Age	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
*89	35	F.	2 weeks.	Ankles and knee painful and swollen. Tongue clear. Appetite good. Bowels regular.	R Tinct. Guaiac. Ammon. ʒj. ter die. Tinct. Iod. locally applied.
90	45	M.	5 weeks.	Pain in knees and ankle. Skin natural. Appetite poor. Bowels regular. Sleeps little. Pulse 108.	R Pot. Iod. grs. v. Vini. Colch. Rad. gtt. xv. ter die.
91	26	F.	2 weeks	Ankles slightly swollen and painful. Skin natural. Tongue dry. Bowels costive.	R Lin. Opii. to joints.
92	29	F.	6 days.	Pain in feet and ankles, particularly in the morning. Tongue with brownish coat. Appetite good. Bowels regular. Pulse 90.	R Tinct. Guaiac. Am. ʒj. ter die. Pot. Acet. ʒij. daily.
93	20	F.	3 weeks.	Much pain in ankle and shoulder. Left foot and ankle red and swollen. Tongue with slight coat. Appetite poor. Bowels costive. Pulse 88.	R Same as above.
*94	22	F.	12 days.	Pain in back and sides. Intelligence good. The cheeks flushed. Skin natural. Tongue clear. Appetite fair. Bowels regular. Pulse 84.	R Tinct. Acon. Fol. gtt. xxx. Quin. Sulph. grs. xv. Mist. Formyli ʒij. ter die.
95	25	F.	1 week.	Complains now only of pain in lower half of right chest. Appetite poor. Catamenia present and regular.	R Tinct. Ferri Chloridi.
96	40	F.	2 weeks.	Much pain in left ankle. Bowels regular. Appetite good.	R Sulphur and Cotton batting to ankle. Tinct. Iodini 9th day.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Slowly improved.	35	Well.
Normal.	Severity of attack had passed before admission. Steadily improved while in hospital.	9	Well.
Normal.	Acute symptoms had subsided before admission. Soon relieved of pain, but remained for other troubles.	30	Well.
Normal.	Return of pains on 10th day. Otherwise progress favourable and rapid.	13	Well.
Normal.	Rapid.	9	Well.
Normal.	Complained mostly of headache, vomiting and constipation.	30	Well.
Normal.	Before admission had complained of pain and swelling of joints. Rapidly improved.	7	Well.
Normal.	Gradual.	24	Well.

No	Age.	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
97	25	M.	5 weeks.	Stiffness in left shoulder. Tongue slightly coated. Appetite good. Bowels regular. Pulse 100.	R Pot. Iod. grs. v. ter die. Tinct. Iodini locally. 8th day, Vin. Colch. gtt. xx., with the Iodide. 18th day, Syrup. Phosp. Trip. 3j. ter die.
98	22	F.	4 days.	Knees painful and somewhat swollen. Bowels costive. Sleeps poorly. No appetite. Considerable perspiration. Tongue clean.	R Tinct. Iodini to knees. 16th day, Tinct. Ferri Chlor.
*99	20	F.	6 weeks.	Right knee and hip somewhat painful and swollen. Tongue clean. Appetite good. Bowels costive. Feels weak.	R Tonic.
100	35	M.	12 days.	Left knee and ankle much swollen and painful. Intervening portion œdematous. Left elbow slightly red, swollen and painful. Tongue thinly coated. Bowels costive.	R Potass. Iod. grs. v. ter die. 16th day, tonics.
*101	32	M.	1 week.	Right shoulder, elbow and joints of lower extremity swollen and painful. Appetite poor. Bowels regular.	R Sulphur and Cotton to joints. Pulv. Ip. et Opii.
102	24	F.	2 weeks.	Right ankle and knee and left shoulder slightly swollen and painful. Poor appetite. Bowels regular.	R Pot. Iod. grs. v. ter die.
103	38	M.	4 days	Pain and considerable swelling of left knee. Appetite poor. Heart normal. Bowels generally regular.	R Lin. Opii to leg. Afterwards Tinct. Iod. Eth.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Right knee almost immediately relieved. Pain lingered in the left.	30	Well.
Normal.	Gradual.	21	Well.
Normal.	Severity of disease had passed before admission. Improved rapidly.	7	Well.
Normal.	Left became much swollen and very painful. Also had pulmonary trouble with considerable fever. 23rd day, distinct fluctuation. Transferred to surgical ward.	22	Well.
Normal.	Rapid.	16	Well.
Normal.	Rapid.	10	Well.
Normal.	Pain immediately relieved and swelling began to diminish.	9	Nearly well.

No.	Age	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
104	30	M.	2 weeks.	Pain in raising right arm. Some swelling of feet. Tongue thinly coated. Appetite good. Bowels regular. Pulse 78.	R Pot. Iod. grs. v. ter die.
105	43	F.	25 days.	Slight pain in side. No pain in joints. Tongue thinly coated. Bowels regular.	R Pot. Iod. grs. v. ter die. 11th day, Tinct Guaiac. Amm. 5ss substituted. 23rd day, tonics.
106	70	M.	5 weeks.	Pain and redness of ankles. Tongue natural. Bowels costive.	R Pot. Acet. et Bicarb. aa. 5ss. ter die. 14th day, tonics. 17th day, Vin. Colch. Sem. gtt. xv. Tinct. Opii gtt. v. ter die. Omitted after 10 days.
107	31	F.	5 days.	Both knees and ankles painful and slightly swollen. Appetite poor. Tongue thinly coated. Skin moist. Pulse 100.	R Pot. Iod. grs. v. ter die. 14th day, tonics.
*108	25	M.	4 weeks.	Stiffness, with pain on motion in hips, ankles, knee and shoulder. Skin moist and cool. Appetite good. Tongue clean. Bowels costive. Pulse 104.	R Syrup Calcis, gtt. xx. every 2 hours. Sodæ Bicarb. Tinct. Opii aa. 5ss. Aquæ Oss. to joints.
109	20	F.	1 week.	Pain and slight swelling of left wrist and hip and right ankle. Tongue slightly coated. No appetite. Sleeps poorly.	R Pot. Bicarb. et Acet. aa. 5ss. and Liq. Am. Acet. aa. 5ss. Every 3 hours. 10th day, Vin. Colchi, gtt. x. added to each dose. 25th day, first prescription omitted. Pot. Iod. grs. v. substituted.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Did not suffer while in hospital.	13	Much relieved.
Normal.	Before admission had suffered much pain in joints, which returned a few days after admission. Progressed slowly.	35	Much relieved
Normal	Slow.	60	Nearly well.
Normal.	Slowly improved.	40	Well.
When discharged, little roughness with first sound. Most distinct at apex.	No pain after 5th day.	22	Well.
Normal.	Slow.	60	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission.</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
*110	28	M.	5 days.	Pain in joints of both legs. Tongue clean and dry. Appetite poor. Bowels costive. Pulse 96.	R Pot. Acet. ʒj. every 3 hours 6th day, omitted. 13th day, Vin. Colch. gtt. xx. ter die.
111	39	M.	4 weeks.	Pain in right ankle and knee. Latter swollen. Tongue with white coat at centre. Bowels costive	R Pot. Acet. ʒj. ter die, 6th day. Pot. lod. grs. v.
*112	22	M.	20 days.	Large joints somewhat painful and swollen. Bowels costive.	R Pot. Acet. ʒij. Aquæ ʒviij. ʒss. quater die.
113	58	M.	10 days.	Pain in both knees and left hip. Tongue clean. Appetite good. Bowels regular.	R Sol. Pot. Bromid. ʒij. for first day.
*114	58	M.	3 weeks.	Right shoulder, wrist and left elbow swollen and painful. Skin warm and moist. Tongue slightly coated. Appetite poor. Pulse 112.	R Pot. Acet. ʒss. during day. 8th day, Tinct. lod. to cardiac region. 11th day, Vin. Colch. Sem ʒij. Tinct. Digitalis ʒj. Pot. lod. ʒj. ʒxv. ter die.
115	37	M.	8 days.	Pain in large joints of lower extremity. Profuse perspiration. Tongue with thick clammy coat. Appetite poor. Pulse 84.	R Pot. Acet. ʒj. every 4 hours. 9th day, Pot. lod. grs. v. ter die.
116	27	F.	6 days.	Left ankle swollen and painful. Tongue slightly coated. Appetite good. Bowels costive. Pulse 96.	R Pot. Acet. ʒj. quater die. 29th day, put on Iodide.

* Private Patient.

<i>State of Heart Throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Slow. Pain continually returning.	45	Well.
Normal.	No pain was felt after 2nd day, but only stiffness.	14	Well.
Normal.	Had had an attack of rheumatism 6 weeks before.	27	Well.
Normal.	2nd day, almost free from pain.	4	Well.
Normal on admission. 17th day, rasping sound most distinct an inch below and outside left nipple. 11th day, much diminished. 14th day, had almost disappeared.	Slow.	35	Well.
5th day, sounds of heart were feeble, and continued so several days. No murmur throughout.	5th day, pain had disappeared, but there was feeling of oppression in cardiac region. Soreness occasionally.	17	Well.
Normal on admission. 3rd day, murmur with 1st sound over third costal cartilage. Next day had disappeared. 5th day, systolic soufflé heard over base, and transmitted into carotids. When discharged normal.	Gradually improved.	30	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
117	31	M.	18 days.	Wrists painful and swollen. Hips painful at night. Skin natural. Appetite poor. Tongue clean. Pulse 72.	R Pot. Acet. 3ss. during day. 15th day, Pot. Iod. gr. v. substituted. 27th day, Syrupi Trip. Phos. 5j. ter die.
*118	29	F.	1 week.	Both ankles swollen and painful. Shoulder and knees less affected. Tongue coated. Bowels costive. Pulse 120.	R Pot. Acet. grs. xx. quater die. 3rd day, dose doubled. 10th day, Vin. Colch. gtt. xx. ter die. 25th day, Ol. Morrhuæ. Continued 3 weeks.
119	17	F.	1 week.	Pain in shoulders, left hand and knees Bowels costive. Thirst intense. Tongue coated. Bowels regular. Pulse 120.	R Pot. Acet. grs. xx. ter die. Tinct. Iodini locally. 20th day, Pot. Iod. gr. v. ter die substituted.
120	35	F.	4 days	Pain, redness and swelling of both ankles and both knees. Pain in both hips. Tongue with dry coat. Appetite poor. Considerable thirst. Pulse 108.	R Emplestra Vesicata to painful parts. 20th day, Pot. Iod. Tinct. Iodini over cardiac region. 24th day, Tinct. Digitalis gtt. v. ter die.
*121	19	F.	10 days.	Redness and swelling of all the larger joints. Tongue with brown coat. Anorexia. Pulse 102.	R Pot. Acet. ʒij ter die. Tinct. Iodini to more painful parts 19th day, Potass. increased to ʒj. End of month, Potass Iod. substituted.
122	19	F.	4 days.	Pain and swelling of hands knees and ankles. Tongue with white coat. Much thirst. Appetite good. Bowels regular. Pulse 100.	R Pot. Acet. 3ss. ter die. 9th day, Pot. Iod. grs. v. ter die substituted.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Gradual, with relapse.	30	Well.
On admission, normal. 14th day, slight soufflé with first sound	For 4 days symptoms grew worse. After that recovery was gradual, complicated with gastric symptoms.	90	Well.
On admission, slight murmur with first sound.	Pain continued to be severe for 4 days. After that improved steadily.	49	Well.
Normal on admission 30th day, systolic soufflé. Normal when discharged.	At first relieved of pain. Afterwards became worse, and was delirious. Pain in cardiac region. Pulse 108. In 8 days pulse 80. Much better.	30	Well.
Normal.	Pain in joints rapidly subsided. Pulse 88. Pain afterwards returned. Progress gradual.	60	Well.
Normal.	Rapid recovery, until exposure on 8th day brought on renewal of attack. Then improved gradually.	37	Improved.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
*123	42	M.	8 days.	More or less pain in all the joints. Swelling of knee only. Tongue with creamy coat. Appetite poor. Considerable thirst. Pulse 84.	R Pot. Acet. \mathfrak{D} j. quater die 2nd day, increased to \mathfrak{D} ij. 8th day, Pot. grs. v. substituted. 38th day, Acetate resumed for few days.
124	45	M.	5 days.	Pain, with slight redness and swelling of ankle. Bowels regular. Pulse 92.	R Pot. Acet. et Bicarb. \mathfrak{z} ss. ter die. 9th day, Potass. Iod. substituted.
125	33	M.	2 weeks.	Pain in shoulders and arms. Tenesmus and scanty discharges. Vomiting	R Pot. Acet et Bicarb. aa. \mathfrak{z} ss. ter die. 20th day, Pot. Iod. grs. v. substituted for 3 days. 35th day, first medicine resumed.
26	22	M	3 days.	Pain in hands, knees, wrists and ankles. Right knee and ankles red and slightly swollen. Tongue coated. Bowels costive.	R Pot. Acet. et Bicarb. aa. \mathfrak{z} ss. ter die. 7th day, Quin. Sulph. grs. xxiv Potass. Bicarb \mathfrak{z} ss. Tinct. Cardamom \mathfrak{z} ss. Muc. Acac. \mathfrak{z} j. Aquæ \mathfrak{z} xi. \mathfrak{z} j. ter die. 21st day, Pot. Iod. substituted.
127	46	F.	3 days.	Redness and swelling of wrist Skin dry. Tongue with white coat. Pulse 72.	R Potass. Iod. grs. v. ter die.
128	28	F.	2 weeks.	Left knee inflamed and painful. Tongue coated. Bowels loose.	R Pot. Acet. \mathfrak{z} ss. Aquæ \mathfrak{z} iv. \mathfrak{z} ss. ter die. 6th day, Pot. Iod. grs. v. ter die.
129	38	M.	2 weeks.	Swelling of joints of lower extremity. Profuse sweating. Tongue with thick white coat. No appetite. Considerable thirst. Highly coloured urine, Pulse 108.	R Pot. Bicarb. grs. x. Liq. Am. Acet. f \mathfrak{z} ij. every 2 hours. 8th day, tonics. Pot. Iod. grs. v. ter die.

Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Became chronic.	70	Well.
Normal.	Pain extended to other joints. Slow.	45	Well.
Normal.	Complicated with dysentery in early stage.	54	Well.
Normal.	Slow.	90	Well.
Normal.	Had had previous attacks. This one not severe.	28	Well.
Normal.	Pain confined to knee, which remained much swollen for a month. Pain then in side. Relieved by counter irritation.	90	Well.
Normal.	Rapid improvement for 10 days. Pain returned, and inclined to become chronic.	30	Improved.

No.	Age	Sex	Duration before Admission	Character of Attack on Admission.	Treatment.
130	23	M.	7 days.	Pain and tenderness of all the joints and swelling of right wrist. Skin natural. Tongue moist with brownish coat. Respiration natural. Pulse 76.	R Syrui Calcis gtt. xx. every 2 hours.
131	21	F.	8 days.	Pain, redness and swelling of joints of right arm. Countenance flushed. Skin warm and moist. Tongue clean. Pulse 118. Bowels constive.	R Syrui Calcis gtt. xx. hourly.
132	29	F.	7 days.	Pain in ankles and knees. Skin natural. Tongue clean. Pulse 60. Respiration easy. Bowels regular.	R Syrui Calcis gtt. xx. every 2 hours. Pot. Acet. Aquæ ad aa ʒij. ʒj. ter die.
133	20	F.	10 days.	Pain in knees. Skin warm and dry. Respiration easy. Tongue moist. Bowels regular. Pulse 92.	R Pot. Acet Pot Bicarb. aa ʒss. every 3 hours. 6th day, Pot. Iod. grs. v. ter die.
*134	25	F.	2 days.	Pain, redness and swelling of ankles and wrist. Skin warm and moist. Tongue with white coat. No appetite. Much thirst. Pulse 120.	R Potass. Bicarb. ʒij. Pot. Acet. ʒij Pot. Nit. ʒij. Liq Ant. Acet. ʒviij. ʒij in Acidi Citrici. Liq. Ant. Acet. ʒiv. Next day, Pot. Acet. et Bicarb. aa ʒss. every 4 hours. After 3 days, original medicine resumed. 9th day, Pot. Iod. grs. v. ter die substituted.
135	29	M.	3 weeks.	Pain, redness and swelling of wrist and knee. Skin warm and moist. Tongue moist, with white coat. Pu'se 92.	R Pot. Acet. et Bicarb. aa ʒss. every 3 hours. 20th day Tonics. 24th day, on return of pain, Vin. Colch. gtt. xx.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
2nd day, soft mitral systolic murmur.	Rapid.	13	Well.
Normal on admission. 2nd day, soft systolic murmur at apex.	Very rapid.	3	Well.
Normal.	Rapid. No pain after 15 days.	29	Well.
Normal.	Rapid. Confined throughout to knees.	7	Improved.
Normal.	Slow. Pain mostly confined to wrists and ankles.	40	Relieved.
Normal on admission. 24th day, systolic soufflé at apex.	Slow. With relapses.	30	Well.

No.	Sex and Age	Duration of Illness	Character of Attack on Admission.	Treatment.
20	M	7 days	Pain and tenderness of all the joints and swelling of right wrist. Skin natural. Tongue moist with brownish coat. Respiration natural. Pulse 76.	R Syrupi Calcis gtt. xx. every 2 hours.
21	F	5 days	Pain, redness and swelling of joints of right arm. Countenance flushed. Skin warm and moist. Tongue clean. Pulse 115. Bowels constive.	R Syrupi Calcis gtt. xx. hourly.
22	F	7 days	Pain in ankles and knees. Skin natural. Tongue clean. Pulse 60. Respiration easy. Bowels regular.	R Syrupi Calcis gtt. xx. every 2 hours. Pot. Acet. Aquæ ad aa ʒij. 5j. ter die.
23	F	10 days	Pain in knees. Skin warm and dry. Respiration easy. Tongue moist. Bowels regular. Pulse 92.	R Pot. Acet Pot Bicarb. aa ʒss. every 3 hours. 6th day, Pot. Iod. grs. v. ter die.
234	F	2 days	Pain, redness and swelling of ankles and wrist. Skin warm and moist. Tongue with white coat. No appetite. Much thirst. Pulse 120.	R Potass. Bicarb. ʒij. Pot. Acet. ʒij Pot. Nit. ʒiij. Liq Ant. Acet. ʒviiij. ʒij in Acidi Citrici. Liq. Ant. Acet. ʒiv. Next day, Pot. Acet. et Bicarb. aa ʒss. every 4 hours. After 3 days, original medicine resumed. 9th day, Pot. Iod. grs. v. ter die substituted.
1		3 weeks	Pain, redness and swelling of wrist and knee. Skin warm and moist. Tongue moist, with white coat. Pulse 92.	R Pot. Acet. et Bicarb. aa ʒss. every 3 hours. 20th day Tonics. 24th day, on return of pain, Vin. Colch. gtt. xx.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
2nd day, soft mitral systolic murmur.	Rapid.	13	Well.
Normal on admission. 2nd day, soft systolic murmur at apex.	Very rapid.	3	Well.
Normal.	Rapid. No pain after 15 days.	29	Well.
Normal.	Rapid. Confined throughout to knees.	7	Improved.
Normal.	Slow. Pain mostly confined to wrists and ankles.	40	Relieved.
Normal on admission. 24th day, systolic soufflé at apex.	Slow. With relapses.	30	Well.

<i>No.</i>	<i>Age</i>	<i>Sex.</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
142	20	F.	5 weeks.	Pain, redness and swelling of knees hands and shoulders. Skin warm and moist. Tongue coated. No appetite. Pulse 96.	R Pot. Iod. grs. vi. ter die. 5th day, Sodæ Bicarb. Pot. Bicarb. aa. ʒ ij. during the day. 9th day, substituted Pulv. Colch. Rad. grs. iv. Pulv Ip. et Opii grs. v. Sodæ et Pot. Tart. ʒss. 14th day omitted. Quin. Sulph. gr. i. ter die.
143	23	F.	4 days.	Pain, swelling and slight redness of knees, hips, ankles and right shoulder. Skin hot and dry. No appetite. Tongue with creamy coat at centre.	R Syrupi Calcis gtt. xx. hourly. 6th day, every 2 hours.
144	23	F.	5 days.	Pain in nearly all the joints. Bowels costive. Pulse 112. Regular.	R Simple sedatives at night. 8th day, Sodæ Bicarb. and Potass. Acet. aa. ʒj. every 2 hours. 20th day, Syrupi Calcis gtt. xx. every 2 hours substituted. 30th day, substituted Pot. Iod. grs. v. ter die. 40th day, omitted. At close, opiates and astringents pro re nata.
145	30	F.	1 week.	Pain, redness and swelling of knees and wrists. Pain in elbows and ankles. Skin warm and very moist. Tongue clean. Appetite poor. Bowels regular. Pulse 120.	R Syrupi Calcis gtt. xx. every 2 hours.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
2nd day, soft mitral systolic murmur.	Rapid.	13	Well.
Normal on admission. 2nd day, soft systolic murmur at apex.	Very rapid.	3	Well.
Normal.	Rapid. No pain after 15 days.	29	Well.
Normal.	Rapid. Confined throughout to knees.	7	Improved.
Normal.	Slow. Pain mostly confined to wrists and ankles.	40	Relieved.
Normal on admission. 24th day, systolic soufflé at apex.	Slow. With relapses.	30	Well.

No.	Age	Sex.	Duration before Admission	Character of Attack on Admission.	Treatment.
146	37	F.	2 weeks.	Pain, redness and swelling of right ankle. Pain also in ankle, hips and arms. Tongue with thin pasty coat at centre. Appetite poor. Bowels costive, Pulse 64.	R̄ Syrupi Calcis gtt. x. every 2 hours. After 12 days, tonics, 35th day, Pot. Iod gr. v. ter die.
147	12	F.	1 week.	General weakness of joints with some redness and swelling. Skin warm and dry. Tongue clean. No appetite. Considerable thirst. Pulse 90.	R̄ Syrupi Calcis gtt. xx. every 2 hours.
*148	30	M.	17 days.	Knees, ankles and hands red and swollen Tongue coated. Appetite poor. Bowels regular.	R̄ Pot. Acet. ʒss. ter die. 10th day, substituted Pot. Iod. grs. v. ter die. 17th day, substituted Vin. Colch Rad. ʒss. Syrup. simplex. Syrup. Aurantii aa ʒj. Aquæ Cinnam. ʒ iss. ʒj. ter die.
*149	30	F.	2 weeks.	Swelling and redness of wrist. Swelling of knee and foot. Pain in shoulders, knees and wrist. Tongue coated. Appetite poor. Pulse 108.	R̄ Syrupi Calcis gtt. xx. hourly. 5th day, Potass. Permang. grs. xx. ter die 7th day, resumed first prescription. 15th day, tonics.
*150	19	F.	11 days.	Wrists and hands swollen and painful. Skin hot. Face moist. Tongue coated. Pulse 102.	R̄ Syrupi Calcis gtt. xx. hourly. 10th day, omitted. Quin. Sulph. grs. ij. Pot. Bicarb. grs. xix. Mule. Acac. ʒj. Aquæ ʒss. ʒss. every 4 hours. 22nd day, substituted Pot. Acet. ʒj. bis die. 30th day, previous medicine resumed. 40th day, tonics.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Slow. Pain continually returning.	60	Well.
Normal.	Rapid.	15	Well.
Normal.	Slow.	35	Well.
On admission soufflé at apex following 1st sound 12th day, had nearly disappeared.	Slow.	60	Well.
Normal on admission. 18th day, over apex systolic soufflé with accendulated 2nd sound One month after admission, heard at apex over last half of systole and whole of diastole.	Slow, with frequent return of pains.	60	Nearly well.

No.	Age	Sex	Duration before Admission	Character of Attack on Admission.	Treatment.
151	26	F.	4 days.	Pain in hips. Swelling of left foot and hand. Tongue coated. Appetite and sleep poor. Pulse 120.	R Syrupi Calcis gtt. xx. hourly. 4th day, increased to gtt. xxv.
152	26	M.	3 days.	Pain in all joints on slightest movement. Face flushed. Skin moist. Tongue coated. Pulse 100.	R Syrupi Calcis gtt. xxv. hourly.
153	22	F.	1 week.	Pain in all the joints, particularly ankles, knee, and hip. Countenance flushed. Tongue moist and slightly coated. Pulse 84.	R Syrupi Calcis gtt. xxv. hourly.
*154	20	M.	3 days.	Pain in nearly all the joints. Some headache. Appetite good. Bowels regular. Pulse 107.	R Syrupi Calcis gtt. xxv. hourly. 10th day, omitted. Quin. Sulph. grs. ij. Potass. Bicarb. grs. xx. Muc. Acac. ʒij. Aquæ ʒj. every 4 hours.
155	17	F.	4 weeks.	Knees painful and swollen. Tongue with greyish coat. Appetite good. Bowels regular. Pulse 104.	R Syrupi Calcis gtt. xv. ter die. 5th day, increased to xxv. 7th day, increased to xxx.
156	12	F.	6 days.	Pain in hips, shoulder, knees and ankles. Countenance anxious. Skin hot and dry. No appetite. Tongue clean. Thirst urgent. Pulse 112.	R Syrupi Calcis gtt. xx. every 2 hours. Sodæ Bicarb. Tinct. Opii. aa. ʒss., Aquæ ʒviiij, to joints. 18th day, Syrupi Calcis gtt. xx. every 3 hours. Tinct. Iodini over heart.

* Private Patient.

<i>State of Heart Throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
On admission, slight soufflé at end of 1st sound, over base. 12th day, much diminished. More diminished when discharged.	Slow.	40	Well.
Normal.	Rapidly improved.	13	Well.
Normal.	Rapid.	10	Well.
Normal.	Slow, with return of pains.	60	Well.
Systolic soufflé loudest over pulmonary artery throughout illness. Diminished when discharged.	No pain after 20th day.	40	Well.
Action tumultuous. Bruit with 1st sound. 7th day, distinct friction sound. When discharged, only trace of soufflé mentioned.	Did not suffer much from rheumatism, but complained of dyspnoea and pain in cardiac region.	45	Well.

No.	Age	Sex	Duration before Admission	Character of Attack on Admission.	Treatment.
*157	33	M.	5 days.	Pain with some swelling of feet, knees and wrists. Tongue with yellowish white coat. Pulse 88.	R Syrapi Calcis gtt. xx. hourly. Potass. Acet. and Bicarb. aa. ʒj. every 2 hours.
158	52	M.	1 week.	Pain in knee and feet. Skin warm and dry. No appetite. Bowels costive. Pulse 120.	R Syrapi Calcis gtt. xxx. hourly. Vini Colch. gtt. xj. Mag. Sulph. ʒss. Mag. Carb. grs. xv. during the day.
*159	42	F.	2 weeks.	Pain, redness and swelling of knees, shoulders and wrists. Countenance expressive of pain. Skin hot and moist. No appetite. Considerable thirst. Tongue red and moist. Bowels costive. Pulse 92.	R Syrapi Calcis gtt. xxx. every 2 hours. Vini Colch. ʒss. Mag. Carb. ʒss. Mag. Sulph. ʒss. ¼ pro re nata. Lime omitted on 25th day. Tinct. Guaici. Amm. ʒj.
160	22	M.	5 days.	Pain in back and joints. Anorexia. Urine scanty and high coloured. Pulse 124.	R Potass. Acet. ʒj. ter die. Tinct. Ferri Chloridi gtt. xx. ter die. ʒj every 6 hours. Tinct. Guaiac. Amm. ʒj. ter die.
161	24	M.	7 days.	Pain and swelling of both hands and feet. Bowels costive.	R Pot. Nit. Pulv. Guaiac. Vin. Colch. Rad.
162	19	M.	2 days.	Swelling and redness of both feet and right knee. Bowels costive.	R Vin. Colch. Rad. Pot. Acet. et Bicarb.
163	17	M.	28 days.	Hands and wrists swollen and inflamed. Pulse 100.	R Vin. Colch. Sem. gtt. xx. Pot. Acet. ʒss. ter die.
164	27	M.	17 days.	Both elbows and right ankle swollen and red. No appetite. Pulse 108.	R Vin. Colch. Sem. ʒss. ter die.

* Private Patient.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	Rapid.	14	Well.
Normal.	Rapid	9	Well.
Normal.	Rapid.	16	Well.
Soufflé with 1st sound at apex. Same when discharged.	Good progress from beginning.	36	Well.
Slight prolongation of 1st sound. 2nd sound reduplicated. Normal when discharged.	Good progress from beginning.	51	Well.
Normal	Rapid.	34	Well.
Normal.	Rapid.	29	Well.
Normal	Favourable progression.	29	Relieved.

No	Age	Sex	Duration before Admission	Character of Attack on Admission.	Treatment.
165	24	F.	6 days.	Both ankles red, swollen and painful. Bowels costive. Tongue coated.	R Vin. Colch. Potass. Acet. et Bicarb.
166	21	F.	3 weeks.	Pain in hips, knee and ankles. Pain in præcordia. No appetite. Diarrhœa. Amenorrhœa. Pulse 124.	R Pot. Acet. Tinct. Veratrum Viride. Vin. Colch. Tinct. Digitalis. Tinct. Iodini to seats of pain.
167	20	M.	5 days.	Pain and slight swelling in knee and left shoulder. Anorexia. Sweating. Headache Tongue coated. Bowels costive. Urine scanty and high coloured.	R Vin. Colch. Rad. ʒss. Morphi. Sulph. grs. ij. Mucig. Acac. ʒ iss. Aquæ Cinnamoni ʒ ij. 12th day, Tinct. Iodini to præcordia. 14th day, Extr. Hyoscyami ʒj. Hydrarg. Subrum grs. xj. Fiat. pilulæ No. xij. One ter die. 18th day, Tinct. Digitalis every 6 hours. 21st day, omit pills. 22nd day, omit Digitalis. 30th day, Tinct. Guaiac. Am. ʒj. 37th day, omitted. Tonics.
168	22	M.	1 month.	Pain in right arm and shoulder. Little redness or swelling. Urine high coloured Tongue with brown coat. Pulse 108.	R Pot. Acet. ʒj. ter die. Tinct. Iodini to shoulders. Afterwards Pot. Iodi. grs. v. ter die. Tinct. Iodini to præcordia.
169	23	M.	13 days.	Pain in hips, knees, ankles and shoulders. Bowels regular. Urine high coloured.	R Pot. Acet. ʒj. ter die. Tinct. Digitalis gtt. v. ter die. Bismuth Sub. Nit. Afterwards tonics.
170	45	F.	2 weeks.	Pain in hand and shoulder. Anorexia. Night sweats. Bowels costive. Urine high coloured. Pulse 96.	R Vin. Colch. Rad. Mucig. Acacia aa. ʒj. Murph. Sulph. grs. iv. Aquæ Cinnamon ʒ ij. ʒij. every 5 hours.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Soufflé with 1st sound during attack. Normal when discharged.	Improving.	46	Well.
Mitral lesion. Same when discharged.	Slowly.	66	Much relieved.
Normal on admission. Slight soufflé with 1st sound at discharge.	Good till 12th day. Then complication came on. Sat up all day four weeks after admission.	101	Much relieved.
Normal on admission. Slight systolic soufflé at discharge	6th day, no pain but much stiffness. 26th day, cardiac complication.	38	Well.
Normal.	Slight diarrhoea 3rd day.	35	Well.
Normal.	38th day, Erythematous eruptions on back. Relieved by external applications.	114	Well.

<i>No.</i>	<i>Age</i>	<i>Sex</i>	<i>Duration before Admission</i>	<i>Character of Attack on Admission.</i>	<i>Treatment.</i>
171	15	F.	1 week.	Pain in larger joints. Anorexia. Urine high coloured. Bowels costive. Pulse 108, bounding.	R Pot. Iod. grs. v. ter die. Afterwards Ferri et Potass. Tart. Sodæ Bicarb. aa. ℥iv. Syrup. Gault. ℥iv. ℥aa. ter die.
172	30	F.	5 days.	Pain and swelling in knees, ankles, wrist, and elbow. Tongue coated. Urine high coloured. Pulse 112.	R Vin. Colchi Rad. gtt. x. Tinct. Hyoscyami gtt. xxx. 5ss. ter die.
173	20	F.	7 days.	Pain and swelling in knees and ankles. Tongue coated. Bowels regular. Urine high coloured.;	R Pot. Acet. ʒij. Aquæ Oj. ʒj. every 4 hours afterwards. Vin Colch. Sem. ʒij. Tinct. Hyoscyami ʒj. ʒj. ter die.
174	45	M.	3 weeks.	Redness and swelling of knees, feet, and ankles. Bowels costive.	R Pot. Iod. grs. v. ter die.
175	38	M.	5 days.	Swelling and redness of both ankles and knees. Tongue coated. Bowels free. Appetite poor.	R Potass. Bitart. Vin. Colch. gtt. xv. ter die. Cotton batting.

<i>State of Heart throughout.</i>	<i>Progress.</i>	<i>Days in Hospital.</i>	<i>Result.</i>
Normal.	No complication.	170	Well.
Normal.	No complication.	17	Well.
st sound prolonged when admitted. No murmur at any time.	No complication.	50	Well.
Normal.	No complication.	88	Well.
Normal.	No complication.	88	Well.

SUMMARY OF CASES.

ALKALINE AND NON-ALKALINE TREATMENT.

Whole Number of Cases	300
Under Alkaline Treatment	125
Under Non-Alkaline Treatment	175

Heart affected.

Under Alkaline Treatment	27
Under Non-Alkaline Treatment	38
	<u>65</u>

Heart unaffected throughout.

Under Alkaline Treatment	in 98 cases
Under Non-Alkaline Treatment	in 137 cases
Total	<u>235</u>

Heart affected on admission, or Lesion coming on during first day.

Under Alkaline Treatment	in 10 cases
Under Non-Alkaline Treatment	in 14 cases
Total	<u>24</u>

Heart became affected after first day in Hospital.

Under Alkaline Treatment	in 17 cases $13\frac{2}{3}\frac{2}{1}$ per cent.
Under Non-Alkaline Treatment	in 24 cases $13\frac{5}{7}$ per cent.

Cardiac Disease disappeared while in Hospital.

Under Alkaline Treatment	in 7 cases
Under Non-Alkaline Treatment	in 9 cases

FORM OF HEART DISEASE.

Endocardial.

Under Alkaline Treatment	in 24 cases
Under Non-Alkaline Treatment	in 36 cases

Pericardial.

Under Alkaline Treatment	in 8 cases
Under Non-Alkaline Treatment	in 4 cases

Average Duration.

Under Alkaline Treatment	24 $\frac{3}{4}$ days
Under Non-Alkaline Treatment	32 $\frac{1}{8}$ days

Longest Case.

Under Alkaline Treatment	90 days
Under Non-Alkaline Treatment	170 days

Shortest Case.

Under Alkaline Treatment	5 days
Under Non-Alkaline Treatment	3 days

E R R A T A.

Page 30, line 27, *for* "Andral" *read* "Andral."

" 70, line 5, *for* "slightly" *read* "slightly."

" 91, line 9, *for* "salacin" *read* "salicin."

Page 96.—The appendix of temperature range in "Aitken's Practice of Medicine," and likewise that of Winderlich's and Dr. Ringer's, are omitted in this edition, but will appear in the next.

Page 137, line 29, *after* "in the recent epidemic of cholera" *add* "at Toulon, Marseilles, and Paris."

Page 178, line 28, *for* "a 5" *read* ("5j.")

" 186, No. 30, line 17, *for* "Cardanon" *read* "Cardamon,"

" 226, No. 27, line 16, *for* "Opi" *read* "Opil."

" 226, No. 28, line 26, *for* "Opi" *read* "Opil."

" 226, No. 29, line 32, *for* "Opi" *read* "Opil."

" 236, No. 67, line 10, *for* "perceptable" *read* "perceptible."

" 264, line 48, *for* "substituted" *read* "substituted."

" 264, No. 150, line 27, *for* "Mule" *read* "Muc."

1. The first part of the document is a list of names and addresses of the members of the committee.

